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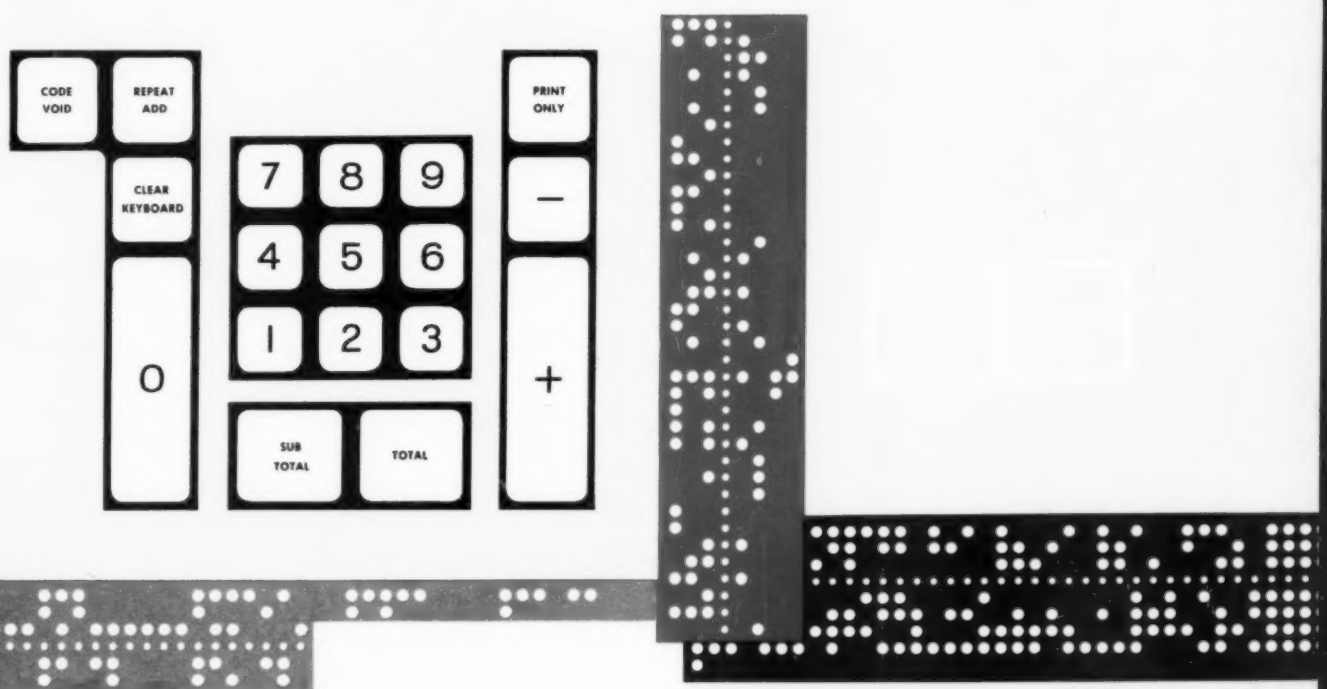
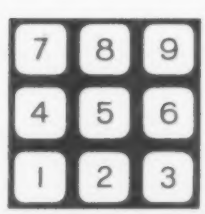
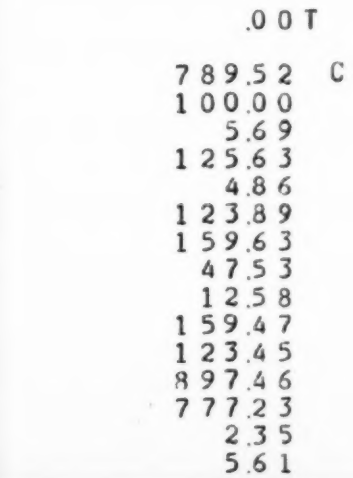
MACHINE ACCOUNTING AND DATA PROCESSING

THE MAGAZINE OF AUTOMATIC OFFICE METHODS AND MANAGEMENT







Punched Paper Tape and the Immediate Future

page 15

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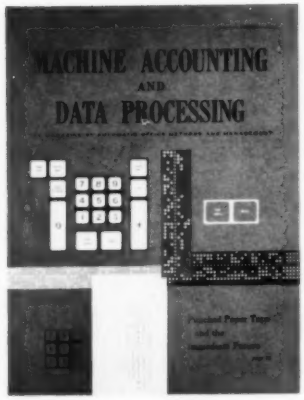
MACHINE ACCOUNTING AND DATA PROCESSING

Volume One • Number Two



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Also publishers of The Punched Card MACHINE ACCOUNTING and DATA PROCESSING Semi-Annual (Applications Volumes)

OBSERVATIONS . . .

from the publisher . . .

IT IS INDEED GRATIFYING to note the fine reception accorded the Charter Issue.

Despite the great amount of research to determine the market potential prior to introducing a new publication, nothing is at all conclusive until the first copies are scrutinized by the readers.

Your reaction to MA & DP has been instantaneous and most encouraging. It has reached us in a variety of ways—through phone calls, wires and letters *(some of which are reproduced in this issue)*. The thousands of subscriptions received to date testify most conclusively that a real need for a publication of this type exists. We are highly pleased to have the opportunity to attempt to fill this need.

Your enthusiastic support has given us renewed eagerness to make this publication one that will be of the utmost value to you. We realize, of course, that there is room for improvement. Much of our guidance in making these improvements will be the result of your correspondence and the questionnaires through which we will seek to determine your needs and desires.

Each issue will continue to center on a theme of timely interest.

This second issue carries as its theme "*Punched Paper Tape and the Immediate Future.*" There is little question as to the tremendous contribution punched tape equipment has made in automating data processing. This information should be of interest regardless of the size of your operation.

MACHINE ACCOUNTING AND DATA PROCESSING

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THE AUTHORS

JOEL M. KIBBEE *("Stating a Problem")* is the American Management Association's Director of Special Projects. What he really directs is their "gaming" program which is the application of simulation techniques to areas of management training such as: executive decision-making, materials management and inventory control. He naturally comes by his philosophy of a precise code for problem statement in "gamesmanship," as well as computing, having initially been trained in that precise science, Physics. He holds a Master's degree from the University of California in Los Angeles. He held various positions with International Business Machines Corporation, including that of Manager of their Houston Data Processing Center, before going on to A.M.A.

JACK MITCHELL *("Cost Distribution")*, as Director of Systems and Procedures at Teleregister Corporation, is responsible for cost estimating, cost accounting and cost control systems. He has a broad background in analyzing office operations and planning conversion to punched card and other mechanized systems, training personnel on these systems after conversion, and writing final instruction manuals.

ROBERT K. BITTMAN *("Paper Tape in the Office")*, manager of Seagram's Data Processing Department for the past two years, received fifteen years of prior ground work in method and procedural development at Western Electric. He is an expert in all phases of data processing, including payroll, order billing, production control, sales analysis, etc., and is a frequent lecturer on computers and systems before the American Management Association, the National Machine Accountants Association and the Systems and Procedures Association, holding membership in the latter two organizations.

ELLIS BAKER *("Statistical Reports As a By-Product of Paper Tape")* is an accountant, certified by the State of Massachusetts as well as New York. He has been in public practice for almost thirty years, thus has seen the evolvement of aspects of his profession far removed from their beginnings.

DAVID MacLAREN IRWIN *("File Maintenance on Magnetic Tape")* was born and educated in Canada. He joined the Aetna Life Insurance Company in 1947 after serving as a Lieutenant Colonel with the Canadian Armed Forces in Europe and Africa. As Assistant Secretary of the Group Division at Aetna, he has been concerned with accounting statistics and methods and with the mechanization of procedures in particular.

J. DOUGLAS ELLIOTT *("The Human Aspects of Electronics")* is Director of Central Data Processing at The Detroit Edison Company in Detroit, Michigan. He is responsible for all phases of the operation of all Detroit Edison EDPM and EAM equipment, including the necessary controls to assure accurate input and output of data. Mr. Elliott, who attended the Detroit Institute of Technology and Wayne University, joined Detroit Edison in 1933 as a clerk in the Customers' Accounts Department; he assumed the post of Director of Central Data Processing this year. He is the author of many articles and papers on both technical and personnel topics which have appeared in various trade publications and has conducted and participated in many American Management Association conferences and seminars. A member of the National Association of Accountants, the Detroit Board of Commerce and the Economic Club of Detroit, Mr. Elliott is Chairman of the Accounting Division Advisory Committee of the Edison Electric Institute.

Comments from Readers

Sir: Thank you very much for the copy of MA & DP, which has just come to my attention. It looks like an excellent addition to the field and I want to wish you every success in your effort.

T. J. Watson, Jr., I.B.M.

* * *

Sir: Let me congratulate you most heartily on the charter issue. I can certainly see that it is a much needed newcomer among business publications and should receive a wide welcome.

Paul A. McGhee, Dean
New York University

* * *

Sir: We wish you every success in keeping up the good work with your new publication. You have taken on an important assignment that should be of extreme importance to everyone who conducts a business today.

Thomas W. Richards
The Baltimore Business Forms Co.

* * *

Sir: My congratulations to you on the first issue of your magazine. It is a worthwhile addition to the literature of the data processing field. You have certainly set a high standard of quality in the articles appearing in the first issue.

Robert M. Gleason,
American Management Association

* * *

Sir: I am in receipt of your charter issue and wish to congratulate you on the excellent manner in which the articles were presented. Your next issue will be looked forward to with a great deal of enthusiasm.

Henry Cooper,
Camlok Fastener Corporation

* * *

Sir: . . . your articles are not only impressive from a technical standpoint, but in addition, they offer down-to-earth information in a very readable form . . .

Morton Siegelbaum,
Digitronics Corporation

* * *

Sir: As you launch your new publication devoted to machine accounting and data processing, we wish you every success. The mounting volume of paperwork and higher clerical costs make mechanization of accounting a subject of vital interest to the business world. We believe a publication such as yours can be of genuine service to business.

S. C. Allyn
The National Cash Register Co.
Dayton 9, Ohio

* * *

Sir: . . . it is a welcome addition to the literature in our field, offering clear and interesting interpretation.

John A. Weil, Remington Rand

* * *

OPERATIONAL SURVEYS
to be conducted by editors of
Machine Accounting and Data Processing

In the next few weeks you will receive a letter and form requesting that you answer questions pertinent to your operations.

The few minutes it will take you to answer these questions will be of great value in providing the raw material for a number of important reports to be published in early issues of MA & DP.

Your cooperation will be greatly appreciated.

The Editors

Sir: Favorably impressed by the new magazine . . . Am also hoping for eventual twelve copies per year.

A/2c M. Pejaski
Pease Air Force Base
Portsmouth, N. H.

* * *

Letters

Mail From All Over — But The Wrong Chapter

Sir: I've been on the receiving end of mail from all over the country since my article, "Scheduling in the Data Processing Department," appeared in your charter issue. This is very gratifying and I thought you'd enjoy hearing about its reception.

I would like to note, however, that it is the North Jersey Chapter of the N.M.A.A. of which I am a past president, and not—as your biographical sketch stated — the Garden State Chapter.

Jack Perlstein
Schering Corporation

The editor wishes to thank Mr. Frederick C. Allgeier, the President of the Garden State Chapter of N.M.A.A. for calling our attention to the error also.

* * *

More About SMART

Sir: On page 36 of your first issue, reference is made to a management decision 'game' called SMART — Systems Managers' Administrative Rating Test. I would be interested in learning more about this 'game.' Could you supply me with names and addresses of specific people to contact for further information?

R. D. Griffith,
KCS Data Control Limited
Montreal, Canada

Dr. Adrian McDonough, Wharton School of Finance and Commerce, University of Pennsylvania, Philadelphia, Pa., headed the group that developed SMART. — EDITOR

* * *

Stating a Problem

19 Ways to solve machine accounting problems *before they occur.*

CIVILIZATION exists solely through man's ability to communicate with man. Nothing is more frustrating than a breakdown in communications. Nor does the level of frustration necessarily reflect the importance of the message. The institutions of men vary in their nobility but the problems involved in their exchange of information are very similar. The key to the tab room's communications may fit many doors.

We are here concerned with communication between the person requiring a special report and the person responsible for working out the machine method to achieve it. This will vary from company to company; in one, it may be the sales manager who states his need to the data processing manager over a cup of coffee; in another, a formal request in triplicate may be submitted to the Procedures Department. Whoever is on the receiving end — system analyst, tab supervisor or computer programmer — the fundamental task is to "state the problem."

The machine accounting or data processing department is a service organization producing reports someone else needs. Before such reports can be made, procedures must be devised, control panels wired, forms designed, electronic brains instructed. But prior to that it is essential to know, accurately and in detail, just what is wanted.

While even the simplest problem must be adequately stated if proper procedures are to result, it should be pointed out that the larger the electronic brain, the more important it is to correctly tell it what to do. For the faster the computer operates, the more rapidly it can make errors and turn out useless reports. And the less need for human intervention and manual methods, the less opportunity for human decisions and manual corrections. A clerk seeing a salary check for $12,345 might know at once that it should have been for $123.45; the tabulating machine would generously print $1,234,567.89 if so instructed.

This article is not concerned with operating accuracy control, or with error elimination, but rather with the tremendous waste in time and money, and the erroneous procedures, that result from a poor problem statement. Suppose, for example, that you are the tab supervisor and that the controller wants you to work out the machine procedures for running the payroll. Listed in the table shown are nineteen questions that must be asked — the same questions that the systems analyst must ask the sales manager who wants a particular sales analysis report, or that the computer programmer must ask the plant manager who wants to "automate" inventory control.

By Joel M. Kibbee

Let us look at these questions one at a time, illustrating them with the payroll application:

What is required and who wants it? Depending on your own methods of record keeping you will want to know the name of the report, who authorized it, which department is to be charged, and so forth.

Who should be contacted for more information? There will always be more information that is needed and you will want to know whom to contact. And during operations it is important to know with whom to get in touch when the unplanned for exceptions arise.

What are the details? This is usually what is meant by a problem statement, unfortunately, it is often *all* that is meant. You will need a complete and detailed explanation of the formulas for computing gross pay, taxes, other deductions and so forth. This might be a hundred page policy manual, and while this may be the meat of the problem the other questions, too often omitted, are the very necessary salt and pepper.

Are there any references? Maybe there is a government report on tax computations, maybe a union contract. Maybe there are articles on the subject with which you are not acquainted. You may work hard and long on the procedures for a sales statistics report only to learn later that the sales manager got the whole idea from an article which he read and which also gave complete details of the machine procedures. It isn't only a question of saving time, but also of avoiding the swamps someone else has already marked on the map.

What is the date of the new procedure? The answer to this question is usually "yesterday." But the answer can affect procedures: on October 24th, you can give a lot of thought for your Christmas list, on December 24th, it is cigars for your uncle, candy for your aunt, and hula hoops for the nieces. Good procedures can save time and money, but yesterday's TV schedule doesn't help tonight's viewing, and if the report is needed in a hurry the procedures have to be worked out in a hurry. There is no question of compromising with accuracy, but you can compromise with elegance.

What is the present volume, frequency and timing? How many people on the payroll, how often must the report be run, when will the data be received and when must the checks be out? The answer to these questions can affect procedures. Consider frequency; a one-time job never to be repeated needn't be too efficient; whether it takes two or three hours on a tab may not be important. But for a daily report, minimum machine time is important. This will influence how much time and effort you wish to devote to working out the procedures and is particularly true of computer programming where many man-months may be spent trying to cut a few milliseconds out of a square-root sub-routine. Such time would hardly be well spent if it were for a program which was to be used only once a year. Similarly, an estimate of the volume is important. To choose the most absurd illustration we might merely point out that a ten-man payroll is best done by hand. Sorting and collating procedures can be influenced by volume; there is also the question of restart procedures which may result in subtotals on the tab or a memory dump on the computer. Finally, timing; when will the data be received, when are the results necessary? The choice might evolve between eight hours on one tab or five hours on two tabs simultaneously: the former is more efficient; the latter gets the job out sooner.

What does the future hold? Maybe the company is on a hiring spree. In computers the limit on storage is always an important factor. Perhaps all master data can be entered into high speed storage and the payroll cards need not be in sort; run out of storage later and you can throw your procedure away. No procedure will last forever — like some super-highways they may be outmoded by the time they are ready for use — but there must be an attempt to answer this question.

What does the source data look like? It is appalling to think that this question might not be asked, but that is often the case. What do the time cards look like, or the order forms, shipping receipts, etc? In planning the layout for a punched card, the most important consideration is often the ease of keypunching from the source document. Or maybe the source data already exists on punched cards — did you ask? The operation starts with the source data and you don't drill round holes for square plugs. A computer program can be extremely dependent on the format of the source data, a fact usually not mentioned in programming courses.

Where did the source data originate? The answer to this question is sometimes surprising. The good systems man isn't content merely to start with the data in its present form, rather he will want to know where it came from, whether it can be recorded in some other format more suitable to subsequent machine procedures and other pertinent questions. For example, in an application wherein surveying data was processed, the quantities arriving in the tab room were required to be added, multiplied and so forth. Investigation revealed that some of these quantities resulted from addition and multiplication of original source data. It was then possible to do all of the computations without an increase in machine time — and to save several days work on the part of a clerk who was preparing the data for the machine room.

What is to be the form of the report? Often you will be free to design the report format; often you won't be. You may be restricted by already existing pre-printed forms; there may be restrictions on the format for a pay check. Good form design is a subject in itself, but it is still part of the overall procedure. It is hardly sensible to select a route on a road map if you don't know where you are going. Output format, just as input format, can greatly influence a computer program — input and output design must precede programming. This fact is too little emphasized on programming courses.

What else is to be done with the report? As for source data, look at the complete system. Maybe someone is going to extract information or take subtotals; an addition to the machine procedure might be trivial. Or does someone intend to make photographic copies of the report because he doesn't know about six-part forms?

From where does the data come, where should the reports be sent? Does someone bring the timecards or must they be picked up? Will someone pick up the checks? How many copies of the reports and to whom are they to be sent?

How big are the quantities and how many decimal places? This question is almost always asked since you

can't wire a control panel or write a computer program without knowing the answer. For all of that it is an easy answer. Maybe you are shown a sample set of computations in which a weekly pay check is for $75.00. And you may feel fairly certain that nobody is making $1,000.00 per week. But ask this question and then ask it again. There is always the wonderful assurance that "our shipments never run over 600 to 700 pounds" except, of course, for the one of 1,200 pounds that shows up the second time the cards are being keypunched.

How long before changing conditions may affect the problem? You ask a similar question about volume and frequency — it is even more important with regard to the size of quantities. You leave three columns for man number and fifteen for last name, and just after Thanksgiving, management announces that they have just hired man number 1000 — Ed Vozhinskovarosky.

Are there any special considerations? There always are and the imagination and ingenuity of the good tab man will seek them out. What about rounding — up or down or sideways? What about this point here, and that point there? In actual use, for example, an insurance company found that their big new computer gave answers that differed, if only by a penny or two, from the old small brain. Investigation revealed that the old procedure allowed for the carrying of only four decimal places, while the new one could carry seven decimal places, and so there were differences in the final rounded results.

What about the exceptional exceptions? What do you do if a man makes only 84¢ in some week but his Christmas Club deduction is $1.00. "Don't worry," you will be told, "it won't happen." But you do worry, since you don't want to issue a check for $999,999.16 — even if it is followed by CR. "What do you want us to do?" you ask again. "Don't worry, it won't happen." This can go on indefinitely, but there is a simple solution. You state what you are going to do — there are lots of possibilities — and since "it won't happen," your "customer" has no reason to object. This method of stating rather than asking can be used, incidentally, in many situations. If, for example, you don't seem able to obtain a clear problem statement, write one on your own preceded by some such comment as "the following procedure goes into effect next Monday." If you really want to get action, you might—though I don't really suggest this — include in your statement something grossly inaccurate.

Is there any test data? Or maybe the question should be "where is the test data?" It is always to be hoped that the person presenting the problem can provide you with sample calculations. Perhaps, at present, the problem is being handled manually. And how long are there going to be parallel operations? Using actual sample data and results, instead of your own test deck, not only checks out such things as board wiring, but also your accurate understanding of the problem.

Are you presently using any controls or checks? You will certainly build-in your own accuracy controls and error checks, but the person presenting the problem may have a few of his own that you will want to know about. You might not need control totals in a payroll application if you were only concerned about underpayments; unfortunately, an overpayment might accidentally be overlooked by the person receiving it.

How long must the boards, cards, etc., be filed? There should always be some formal procedure of knowing when you can destroy the cards or tear down a control panel: What is the chance of a second shot for the one-shot job? Perhaps the person receiving the report has room for fifty thousand cards in the corner of his office. You must, of course, find out if there are any legal or policy considerations with regard to record retention.

This is a long list of questions, but the time it takes to ask them is short compared to the time you'll spend if you don't ask them. They are presented in the hope that they will serve as a useful guide in achieving the kind of clarity of problem-statement that marks the experienced system-analyst, tab supervisor and computer programmer. ■

THE 19 QUESTIONS TO ASK

1. What is required and who wants it?
2. Who should be contacted for more information?
3. What are the details?
4. Are there any references?
5. What is the date of the new procedure?
6. What is the present volume, frequency and timing?
7. What does the future hold?
8. What does the source data look like?
9. Where did the source data originate?
10. What is to be the form of the report?
11. What else is to be done with the report?
12. From where does the data come; where should the report be sent?
13. How big are the quantities and how many decimal places?
14. How long before changing conditions may affect the problem?
15. Are there any special considerations?
16. What about the exceptional exceptions?
17. Is there any test data?
18. Are you presently using any controls or checks?
19. How long must the boards, cards, etc., be filed?

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Data Processing FORUM

QUESTION—"Do Punched Card Installations Actually Reduce Clerical Costs?"

Sydney Ashe, Controller and Assistant Treasurer, Institute for Motivational Research, Croton-on-Hudson, New York.

MANY YEARS OF EXPERIENCE with new and existing machine installations have convinced me that they cannot save money by performing only routine basic operations; rather, the savings come as a result of the great number of fringe operations the installation can perform.

This is particularly true at the Institute for Motivational Research where the punched card installation fills a rather unique role. Our installation is used, not in accounting and allied fields, but in analyzing basic research material. In that capacity it performs a function which we consider invaluable. While it might be possible to obtain the same *basic* statistical information by hand and perhaps even at the same cost, the savings in time which the punched card installation provides is a major consideration. Then too, our equipment provides us with refinements of the basic statistics and with complicated cross-runs which, if compiled by hand, would prove absolutely prohibitive in terms of work hours.

Our punched card installation certainly saves us time, but more than that, it provides an indirect savings; that of increased client satisfaction gained from the added statistical information we are able to offer in support of our psychological findings.

W. P. Livingston, Vice President, Bankers Trust Company, New York 15, N. Y.

A PUNCHED CARD SYSTEM is a manner of doing work. It is inherently neither efficient nor wasteful any more than your fingers, hands and arms are skillful without direction from the brain. At Bankers Trust Company, we have eight punched card installations, costing $500,000 a year rental, with 200 people handling them. Without them we could not continue doing business competitively for the work would not be done quickly enough on a manual basis. To produce it on time without machines, if at all possible, might take hundreds of additional staff. In this expanding economy it is questionable if the additional employees required and space to house them could be found.

J. R. Downey, Partner, Peat, Marwick, Mitchell & Co., Chicago 3, Illinois.

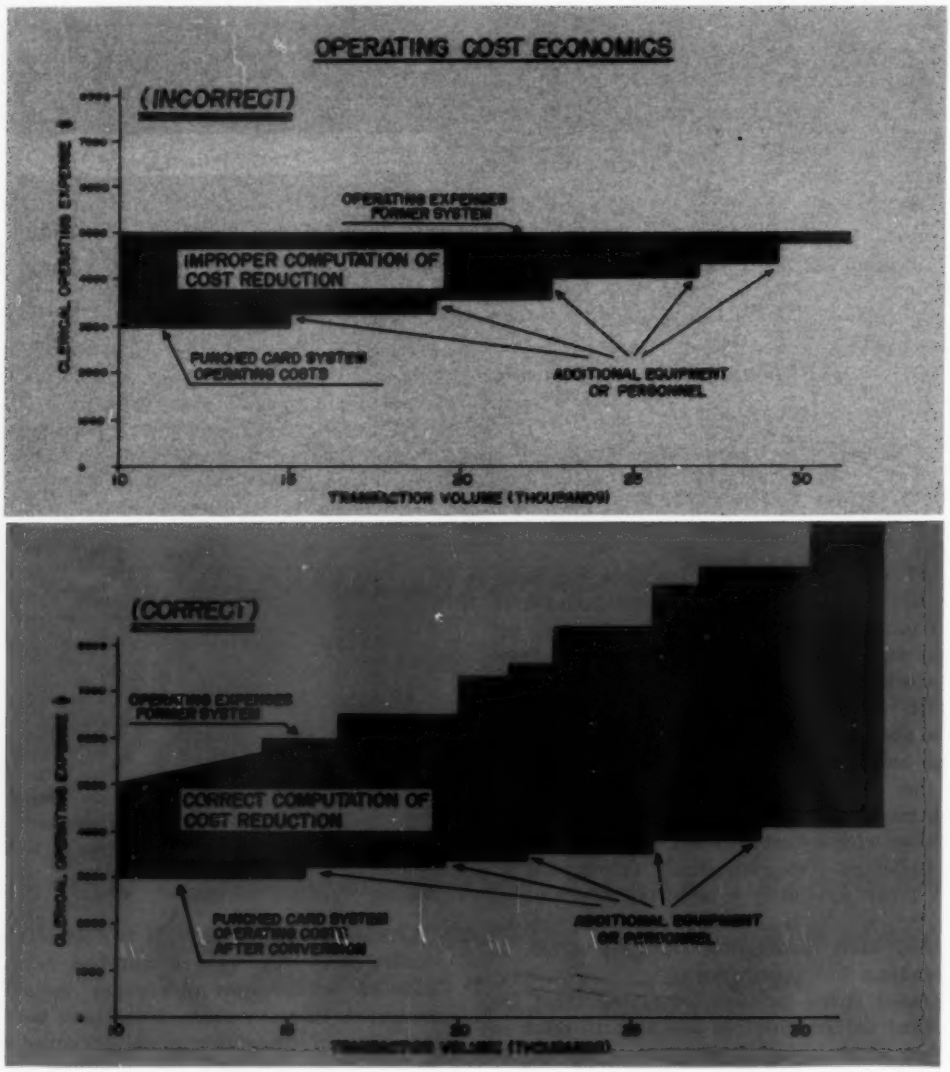
THERE IS NO DOUBT IN MY MIND that in practically every case where punched cards have been installed actual clerical expense reductions can be measured. In many cases, these have been quite large. For some of these substantial reductions it would be erroneous, however, to attribute all the clerical savings to punched card installations because the refinement of the former procedures would have, in most cases, yielded a portion of the cost reduction attributable to the changeover.

Punched card accounting is generally adopted for one or two or both basic purposes. They are: (1) better and quicker reporting, or (2) clerical expense reduction.

In those cases where the equipment has been installed for better reporting many times the overall expense has been increased. However, were these reports obtained by other methods it would have meant an increase in clerical operating costs in excess of the additional machine costs incurred.

A frequent fallacy of some top management people is to forget about volume increases over a period of time. Frequently they compare punched card operating costs with high volume with the low volume manual costs in effect when the system was installed. The exhibit shown below illustrates this erroneous approach.

(continued on next page)



M. S. Newman, Partner
Haskins and Sells, C.P.A.
San Francisco, Calif.

A RECOGNIZABLE ADDITION to the net profit after taxes should result from a well-planned program of mechanization and the mere introduction of machines may help to accomplish a centralization or integration of procedures, the result of which will be to reduce costs.

Why, then, do cost savings often fail to materialize? The primary reason, other than inefficiency, is the failure to foresee organizational problems that will develop. Conflicts between sales, production, and accounting personnel may frustrate the development of adequate machine procedures. Machinery is often ordered on the basis that it will eliminate clerical positions without prior agreement as to which individuals will be released. Another pitfall is the failure to plan properly for a smooth transition to the new procedures. Confidence is easily lost if there is a hectic period of confusion at the time that the change is made.

Cost savings may not materialize because of inefficiency or inadequate procedures; large amounts of money are spent in these areas without adequate planning or control and without adequate review by executive management, or competent personnel acting on their behalf. In other cases, effective savings may have been obscured by inflation and volume. Cost comparisons may be made with prior costs without giving effect to inflation during the installation period. If the previous costs were projected ahead to a comparable basis, the comparison might be more satisfactory. The volume may also have increased substantially during the period of installation, quite often due to the improved handling under the new procedures. Assuming that the previous procedures would have been able to handle this volume increase, it is likely that the operating costs would have increased sharply. The costs of any mechanization program should be considered as to its advantages to the company as a whole and not merely for one part of the organization. Adequate planning and control are essential if clerical costs are to be reduced. ■

Donald MacGregor, Vice President—Production, Zenith Radio Corporation

"Moore forms help us keep inventories at healthy levels"

CONTROL REGULATES ZENITH'S PRODUCTION OF FINISHED TV SETS TO THE MARKET DEMAND

A new system keeps Zenith Radio Corporation from 'running in the dark' when scheduling production. A daily report gives management complete production information at the opening of business each day. This allows faster changes in scheduling, purchasing, and production. Deliveries to distributors go out on time. Capital isn't frozen in large inventories.

On the operating side, data from the production lines and the warehouse are 'captured' in punched cards and fed into an electric accounting machine. The machine prints, on a 6-part Moore continuous form, actual factory performance and scheduled production for comparison. This is Zenith's control in print.

The new Zenith system has brought many operating benefits. With only one copying step, errors are cut to a minimum. Preparation time has been chopped from as much as 10 hours to 2½ hours. Savings in clerical time—5600 hours a year.

The Moore man advised on form design for this Automated Data Processing (ADP) system. For more information and other examples of Moore-planned systems, and the forms tailored to them, write to the nearest Moore office.

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COST CONTROL

COST DISTRIBUTION

The second in a series of articles on controlling data processing department costs. Where and how do you distribute these costs?

By Jack Mitchell

INDIRECT COSTS are those which cannot accurately be associated with specific units of production. The questions of which costs should be included in an estimate, which should be considered indirect, and how these indirect costs are to be prorated, invariably raise serious differences of honest opinion. It is important that management establish one consistent approach to these matters, not only so that estimates from different departments can be compared with each other, but also because the lack of consistent policy encourages managers, consciously or subconsciously, to present estimates in a way that tends to reflect the interests of the individual department rather than those of the company as a whole.

Departmental Charge-Out

The departmental charge-out system is an effective technique for enforcing consistency and accuracy in cost estimates, and it also offers many additional benefits. In most companies *(the larger ones excepted)*, one data processing department services many other departments. With the charge-out system, the machine accounting department does not appear on the company's general books at all. All of its expenses are charged out to the departments which it services.

Under such an arrangement, the managers of the other departments, being responsible for the costs they incur, are more inclined to help the machine accountant find ways of reducing costs. To that end the other managers will learn about punched card principles; they will cooperate in eliminating marginal reports and other unnecessary frills; and they will be inclined to suggest applications for punched cards which might otherwise never be considered.

This method of distributing costs is admittedly not easy, but from management's point of view it is well worth the effort. Not only does it oblige the tabulating department to keep additional records — these, of course, are by-products of records they should be keeping in any case — but it also forces a certain number of arbitrary decisions. The method of charging out idle machine hours or man hours is a good example. The choice will depend on how the tab department is organized. If certain men and machines must be assigned full-time to service certain functions, then their idle time should normally be charged to these functions. If there are trainees, operators or board wirers who "float" to wherever they are needed, then their idle time must be apportioned over all jobs in some fair proportion. Similarly, when overtime is required, it must be charged to the job on which the time was expended, to another job which delayed this one, or to the overall machine accounting overhead.

A specific, consistent and logical policy on these and other questions is required. But one of the beauties of departmental charge-out is that the same questions must be answered in cost estimating. If someone has had to sweat through such problems in apportioning actual costs, he'll be far less likely to overlook them, or to be inconsistent, when he estimates costs.

A particular difficulty of a charge-out system is that it makes it difficult to "sell" slack period jobs which cannot bear their fair proportion of the indirect costs. The ideal solution is to give no cut rates.

A common practice includes in charge-outs and in cost estimates only those costs which are charged, on the company's general books, to the machine accounting department. Such an approach facilitates departmental charge-out, simplifies the testing of the accuracy of cost estimates and offers certain other operating advantages. When this practice is used, it is essential that personnel who base decisions on the estimate be aware that general company overhead is not included. *(See Part 1, November/December).*

The practice should be avoided in companies which do not charge to the machine accounting department such items as punched cards, ribbons, forms, supervisory salaries, etc.

Identifying Indirect Costs

The determination of which costs are direct, and which indirect, is a much-abused area. Generally, a cost should be treated as direct whenever possible. One large manufacturing company may prepare its punched card cost estimates by figuring only the tabulator time required for the job and

extending this at a rate determined by dividing total utilized tabulator hours into total machine accounting department costs. Presumably, they would do this for convenience and on the theory that tabulator time being the most expensive single item of cost in the department, all other costs would average out in the long run. The fact of the matter is that the other costs do average out; however, any particular estimate can be in serious error despite this. The primary objection to such an approach is not merely that it violates sound accounting principles, but that it most certainly will lead to wrong decisions. It will result in putting uneconomical jobs on tab, when such jobs include a disproportionately large amount of punching, verifying, sorting, collating, reproducing and calculating. It will also lead to rejecting jobs which involve only minor reprocessing of existing cards.

A medium-sized utility company actually charges the salaries of its five highly-skilled programmers as overhead to its entire punched card and data processing operation. In so doing, they are making long established simple punched card jobs bear part of the cost of their recent medium-sized computer installation. From the standpoint of accurate cost estimates, this approach is strikingly unrealistic; those programmers should be charged only to those jobs upon which they spend their time, just as board wiring time should be charged in a conventional tab room.

The practice of weighting hourly charges for idle time computed separately for each machine type and category of labor has the additional advantage of forcing study of the machine utilization records and the personnel utilization records which every installation should maintain. Study of these records frequently leads to important cost reductions. In addition, it recognizes the fact that every tab installation, no matter how well run, will have some idle time *(just as it will have some reports which are out of balance)* and that it is the tab manager's responsibility to keep this to a minimum.

Cost Handling Variations

Despite the advantages claimed for the departmental charge-out system, it should not be assumed that costs should always be handled in the same manner when they are estimated as when they are charged out. For example, consider the case of a small, unsubdivided tab department, which is considering taking on a new job. This job may conflict with existing schedules which cannot themselves be changed; thus overtime can be predicted. For the sake of conservatism, the full cost of the overtime premium should be estimated as part of the cost of the job; otherwise uneconomical jobs will be put on tab. However, in charging out the job, all overtime premium costs of an unsubdivided tab department should be spread out over the department's total labor charge; it would not be fair to give certain jobs a free ride merely because they were there first.

The cost of re-running reports which are out of balance should normally be considered overhead, rather than a direct charge to the job which had to be re-run. This approach is realistic in that it recognizes that such things will happen occasionally in any tab room. Even when the re-run was caused by faulty source documents received from another department the tab manager should realize that it is his responsibility to demand controls which will detect such situations before they have necessitated costly re-runs. In addition, the cost of tracking down the error, and the friction occasioned by getting the manager responsible to admit his error and absorb the charge is frequently not worth whatever advantage there might be in charging the re-run directly.

No particular problems are involved in such indirect costs as supervision, clerical salaries, the direct costs of preparing internal reports *(e.g., machine utilization records)*, etc. These costs are readily determinable and it is sufficient to recognize that they exist, and that every job performed by the tab department must bear its proportionate share of them.

Some companies consider such costs as cards, ribbons, forms, etc. as part of overhead. Since these costs can vary considerably between different jobs, and since they can readily be associated with specific jobs, they should be computed separately for each job, then estimated and charged as direct cost.

Once the total overhead has been determined, the problem still remains of how to associate it with the jobs being performed. Most cost accounting texts describe at least half a dozen ways of doing this. None of them are perfect, and for this reason the best approach is to pick a simple way, such as a flat *(and constantly recomputed)* percentage of either direct machine rental, direct labor, or of the total of the two. In a few cases it may be desirable to compute those indirect costs which are associated with labor *(supervision, overtime and shift premiums, etc.)* separately and apply them only to direct labor charges. However, further refinements *(such as computing a separate overhead rate for storing cards)* are seldom worth the effort.

The Principle of Conservatism

The principle of conservatism is one which should never be overlooked in the preparation of a cost estimate. It is generally preferable to err on the side of overstating the costs of a proposed job than to make a change which is uneconomical.

One of the most dangerous traps in cost estimating is the temptation to compare directly the ac-

tual costs of an operation as it is now being performed with the theoretical costs in an estimate. Even supposedly reputable management consultants will sometimes use this technique, usually, it is rumored, because they hope thus to sell their own services in installing the proposed new system. Such comparisons are dangerous for the following reasons:

1. *In most cases, improved supervision or minor changes in methods can reduce present costs.*
2. *Almost invariably, when a job which was being done manually is put on punched cards, numerous exceptions and other unforeseen requirements come up.*

What then, is the purpose of an estimate, if it is not to be compared with present costs? There is a way around this and although it may sometimes be laborious, it is essential if the final decision is to be a good one. Remember, the costs in the estimate are theoretical. Therefore, take a long, hard look at the present system. Estimate, *likewise theoretically,* what its costs would — could — *should* be if the present system were refined, brushed up, revised slightly and then performed and supervised as efficiently as the original estimate assumes the punched card system will be performed. Then and only then can the comparison be of like units. Comparing theoretical costs with actual costs is like comparing oranges with watermelons.

Conservatism calls for a discussion of that indispensable ingredient of all cost estimates — the safety factor. It is not realistic to apply a standard safety factor to all jobs that are estimated. Even if all estimates are prepared in a consistent manner, it is still necessary to preserve their discretionary nature by varying the safety factor, if the estimates are to be really meaningful. The value of the estimate is dependent on the quality of the safety factor; this is in turn dependent on the knowledge, wisdom, experience and honesty of the man who decides it. It would be trite to list the elements which would affect the size of the safety factor; about all that can be said is that it normally lies somewhere between 15% and 100%.

Making The Decision

The most significant aspect of cost estimating is making the decision based on the estimate. It is at this point, and not until this point, that conservatism can be abandoned.

Normally, there are two major types of decisions for which cost estimates are prepared. One is to compare present costs *(figured theoretically, as described above)* with proposed costs; the other is to evaluate whether the end result is worth the cost. Most such decisions are a combination of these.

With respect to the first category — present cost vs. proposed cost — cost as estimated should never be the sole factor. Five other factors deserve consideration; all five of them are in favor of performing the job on punched cards.

1. **Cost stability.** Generally, a rented piece of punched card equipment will not ask for a raise as frequently as the clerks who are now preparing the report manually.
2. **Systems integration.** At a later date it will be easier to integrate two parts of a system if both are on punched cards.
3. **Stability of procedures.** Anyone who has ever converted a manual procedure to punched cards knows manual procedures are almost invariably loaded with exceptions. Manually or mechanically, these exceptions are a costly headache. They creep in, in various ways. Sometimes it might be a vice-president who calls Susie the clerk. *(He used to flirt with her when he was working in the mail room.)* He asks her to throw in an additional fillip. Susie doesn't know how much the fillip will cost; she may not even care. But she does know that he's a vice-president, and an old friend. She adds the fillip; frequently her boss knows nothing about it. But four years later, just try to get rid of that fillip!

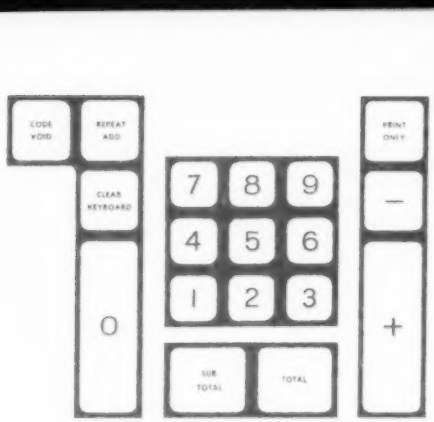
In an other case, one of three clerks doing a basically identical job discovers a different—possibly better—way of doing it. She tells no one; just proceeds to do it her way. Again, her boss may never know.

Unfortunately, it cannot be said that these things don't happen in tab rooms. But there is no doubt about the fact that they are a lot less likely to happen there.

4. **Better management.** On the whole, tab supervisors are better managers than their clerical, nontechnical counterparts. In part this might be because men who are inclined to, and accustomed to, working with punched cards get into the habit of logical, precise thought, and controlled, written procedures.
5. **Less personal dependence.** Most tab rooms have written procedures; they need them. If these procedures are written as precisely and as completely as they should be *(i.e., as precisely and completely as a plug board is wired)*, then personnel turnover is not catastrophic.

For these reasons, if the cost estimates being compared are close, the best decision would be in favor of punched cards.

The second category of decisions—is the product worth more than the cost—is really beyond the scope of this article. If the estimate is as accurate as possible it is up to the man who is buying the product to decide. But it is up to the estimator not to let himself be bullied into reducing the estimate unless a genuinely different means of doing the job is proposed. ■



COVER FEATURE

Punched Paper Tape and the Immediate Future

The Editors here reiterate an important analysis of punched paper tape techniques with comments pertinent both to users and suppliers.

THE BROAD CONCEPT of Integration in Data Processing can include every conceivable means of causing office equipment to operate automatically. This would include conventional punched card equipment, electronic equipment, pre-printed spots on forms that can be read automatically, and many more. This broad concept can also include any office equipment, service or supplies which simplify, combine, eliminate, or otherwise improve paper handling techniques, such as marginally punched cards, multiple part or continuous forms, mechanized files, etc.

Let's confine ourselves for the purpose of this discussion to that concept of integration in data processing which revolves around *punched paper tape* or its equivalent.

Users Of Paper Tape

Who can use paper tape methods? Suppose we start by classifying potential users and then analyzing the future demands of each:

1. *Large companies who use telegraph communications extensively.*
2. *Large companies who do* not *use telegraphic communications extensively.*
3. *Medium-sized companies.*
4. *Small companies.*

Large Companies Using Teletype Extensively

Let's define a large company. For our purposes in this discussion, we are concerned with companies that are "large" in terms of paper work. We will call a company large if it has 1,000 or more employees performing clerical work. This narrows down the large companies to a few hundred. A great deal of sales and promotional effort has been directed at large manufacturing organizations who communicate by telegraph between factories, warehouse, sales offices and a central head office. Many of these systems which take advantage of the by-product punched teletype tape have been installed, and each is a sizable operation. Considering that this progress has been made during the past year or so, it is apparent that here is one application for integration of data processing. To determine just how big it is, we must determine how many large companies use telegraphic communications for regular processing of daily transactions, as compared to those who do not. The two major communication utilities can tell us that of these large companies, about half use teletype communication extensively. If this is so, we should then look to our second market, the large companies who do *not* use teletype communication extensively.

Large Companies Not Using Teletype Extensively

In many large companies there are frequently a series of key-driven operations which take place every time a transaction occurs. We think it was Red Motley who coined the expression, *"In business, nothing happens until somebody sells something to somebody,"* and to that, let's add, *"Then everything happens."* What are some of these repetitious key-drive processes that take place when a transaction occurs?

On an adding machine, control totals are established and then they are checked. On a key punch machine, cards are produced and then the key-drive process is repeated to verify them. It is often necessary to go through more key-drive steps to type forms for internal, customer and other uses. These typings, of course, must be checked in some manner, and this checking must be another manual operation. It is logical that the only way to check a manual operation is by repeating it or in some other manual manner testifying to its accuracy. In one firm, we recently counted nine manual repetitious key-drive operations required for each transaction. Each of

these operations had to be checked.

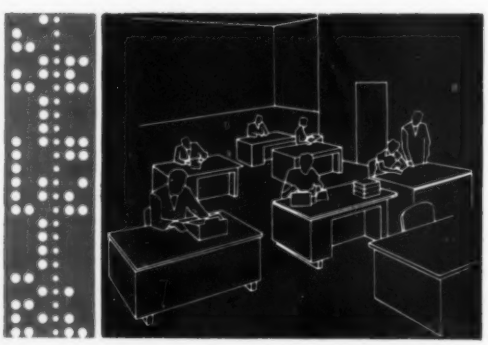
These large companies are the places where electronic computers will be widely used. It is important that computer input be accurate. Mistakes are relative. A mistake made by a private in the Army usually does not have the tragic consequences of an error on the part of a Commanding General. Punched tape equipment can provide accurate and automatic input to the computers used by these larger companies. Here, then, is another big market that has hardly been tapped in large companies.

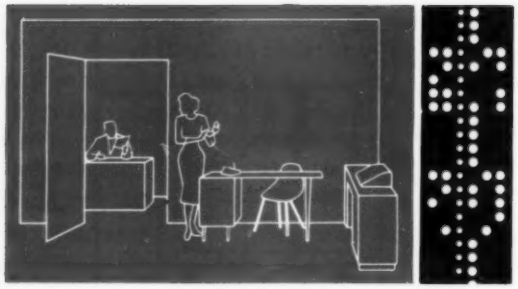
Medium-Sized Companies

How can the medium-size company use punched tape equipment to its advantage? The medium-size company we will define as one which employs about 100 to 1,000 clerical employees. One area for punched tape equipment is in relieving the scheduling problem associated with a conventional punched card installation. Those of you who are familiar with the punched card department activity will notice that when a punched card system is installed to take care of a few major clerical functions, there is a certain percentage of machine time that is idle. This idle machine time seems to disturb management, and they look around for some kind of new report that they can use to fill in this gap. The degree of effectiveness at which a punched card installation operates is sometimes measured by how good a job it does of keeping the machine running instead of how good a job it does of getting the work out economically.

When this happens, small payrolls, small accounts payable and other jobs that are sometimes too small to justify mechanization but have rigid scheduling demands are converted to the punched card system. These rigid scheduling demands are such that they may disrupt the major activity that the equipment was originally installed to accomplish. These aggravations strain the schedule of the machine room to a point where something has to give.

It would seem that in a company using punched cards, even though its major jobs may be mechanized, there are enough minor jobs to be done which may or may not presently be mechanized to merit the use of punched tape equipment.





Small Companies

Small companies we will define as those which have less than 100 clerical employees. We will distinguish them from the tiny companies by saying they have at least two or three people performing a routine clerical office job, such as billing.

There are two major reasons why the small company cannot afford to be without mechanization:

1. To economize, which is accomplished by increasing accuracy and speeding up operations;
2. To obtain more effective and current analysis of its business operations.

The first of these improves day-to-day operations and if the economy can be demonstrated, the small firm will probably buy the automatic system that benefits it. If any mechanized system costs less than a manual system, management should be interested, providing the economy can be proven. Sometimes this proof is elusive and a detailed study of the cost of the present system as compared to the cost of the punched tape system is often necessary.

Aside from the cost comparison reason in small companies, we mention a second reason, to obtain for management a more effective and current analysis of their business operations. But frequently the small company management is not accustomed to working with analysis of sales, production, inventory and purchasing and they cannot visualize the benefit of these by-products of automation. Perhaps they are not convinced that reviewing ledgers of the past quarter is like looking into a rear-view mirror when more modernized techniques for faster analysis can provide them with a means for looking through the windshield—so that they can do a better job of seeing where they are going instead of where they have been.

During the past decade many companies have grown from a one-man operation, where the boss could see or sense everything that affected his business, to a larger scale operation, where he is no longer quite sure of everything that is going on in his firm. This is like the comparison between the pilot in a Piper Cub, who flies by the seat of his pants, and needs not much more control than a compass, an altimeter and an air-speed indicator, as compared to the modern four-engine transport pilot who must have sufficient controls and indicators at his disposal so that as soon as any part of his ship

begins to veer from normal, he can spot the trouble immediately and take corrective action to prevent the harm that would otherwise result.

For the small organization that has grown from the one-man company to something that one man can no longer individually and effectively control, there are basic changes which should take place in the structure of the paperwork organization that the boss probably senses, but he goes along living with them for as long as he can manage. This fresh approach to solving his paperwork problems may be just the thing for which he has been waiting.

Barriers to the Acceptance of Paper Tape Methods

There is a shortage of office equipment experts who recognize the importance of getting their story across effectively, both orally and in writing. This shortage of systems experts who can get their story across clearly is probably one of the major deterrents to progress in office automation. Somehow it seems that the man who has the analytical characteristics that are required of a good office systems procedure specialist is frequently not particularly articulate.

He thinks in flow chart symbols and in number of transactions per hour, but not in words or in sentences. What must be sold is a system—a system which saves time and money. There is too much talk about hardware.

Training Salesmen

The supplier and the manufacturer have an obligation to properly train salesmen. If sales representatives are to exercise office systems skill in the solving of a customer's problem, a training program that is extensive is needed. A training program extensive as this should be would not be a one-time shot. It must be continuous. It must be habitual. And it must be well-directed. Such a salesman is taking on the duties of a management consultant and will probably spend more time per customer than he would spend in selling conventional office equipment.

Educating the Potential User

The other portion of training required is "customer" education. So far the potential paper tape customer does not know how to solve his own problems. Many people to whom we have spoken on this subject during the past year have heard a lot about punched paper tape devices and are interested, but they know more about punched cards and computers. They have worked with them, have gone to school for training on them, and now are experts at manipulating them. When they visualize a solution to an office problem, they think in terms of equipment that they know and understand. Because they are trained in the use of this equipment, they can make positive decisions and bold moves in that direction.

Other possible alternatives, such as paper tape, are not clear to them. They are uncertain of what they can accomplish with these techniques, and so they play it safe and stay away from them. The main responsibility for user education lies with the supplier and manufacturer. ■

Last month, the Editors of MA & DP gave you a report on Flowmatic, an automatic programming system. This month, with tongue in cheek, we present, from the St. Louis Chapter of the N.M.A.A. . . .

R.I.N.S.O.
(Real Ingenious New Symbolic Optimizer)

RINSO represents the ultimate sophisticated optimizing routing for use with the recently announced 699 Electronuclear Computing Machine. The routine allows any untrained person with an I.Q. of 40 or more to program any problem capable of definition by the human brain. Logic is taken care of by RINSO.

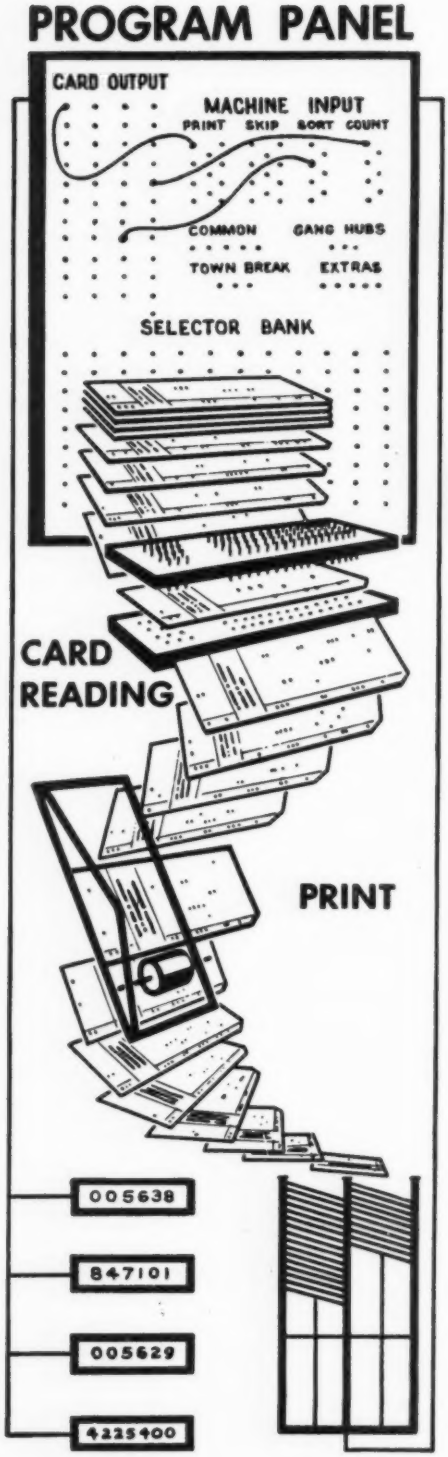
With RINSO, it is not necessary for the programmer to know arithmatic or any advanced mathematics. Nor must he confine himself to the use of English in his choice of symbols. The routine is capable of interpreting symbols in any of the 98 languages officially recognized by the United Nations, as well as in Uto-Aztecan and Quarani.

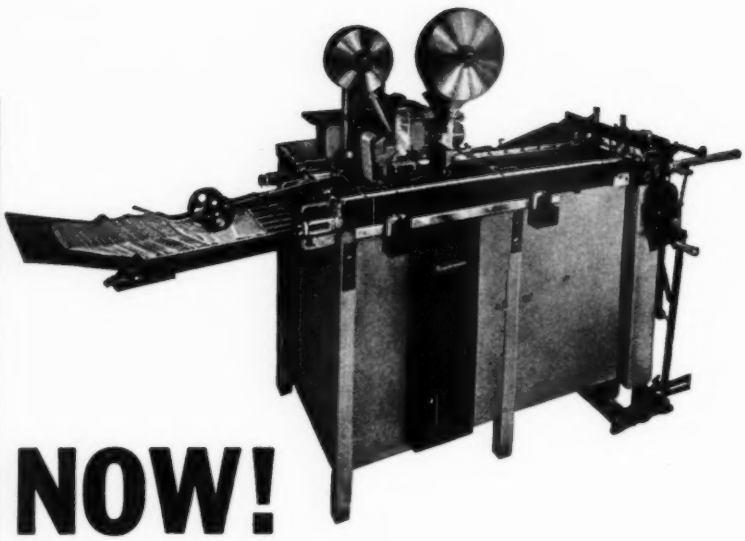
The RINSO deck consists of three punched cards, one of which may be thrown away if the computer is equipped with a floating square root device. The only restriction involving the program is that it be written on a sheet of white paper measuring not more than 4″ x 6″.

To prepare the machine, first drop three RINSO cards into the slot marked "THINK" on the console and place the program(s) sheet on the moving conveyor belt. Set the alphanumeric console switches to "ANALYZE" and push the button marked "GO."

The output of RINSO consists of a printed form from the 499 Accounting Machine listing (1) the program steps in Basic English; (2) an analysis of the program in the light of present-day computing techniques, and (3) a statement of the kind and quality of raw data necessary to make the 699 System economically feasible.

Copies of the RINSO deck may be obtained by writing to: Programmer Number 6969, Ivory Tower, Bellevue Hospital, New York, N. Y.





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SELECTIVE ADDRESSING FROM PUNCHED CARDS IN ONE MACHINE PASS

Electronic "reading" of coded information on IBM, Remington Rand or other punch-card systems permits the Model 101-S Scriptomatic Addressing Machine to print, skip, sort and count *without* disturbing the file sequence.

Many publishers have adopted the Scriptomatic system to their fulfillment operations. Mail order companies and large direct mail advertisers use Scriptomatic for selective punch card control and addressing. Flexible list handling and the great economy of punch card masters over other methods are the two principal reasons for the swing to Scriptomatic.

Here's How SCRIPTOMATIC SELECTIVE ADDRESSING Can Work For You

PROGRAM PANEL can be set up, for example, *to print* all cards in a given category; and at the same time counting all categories for statistical audit.

CARD READING: IBM, Remington Rand or other punch cards are "pin-read", the pulse picked up from the card actuates the printing roller and counters. Reading pins go through the holes to complete selective circuits *you* programmed.

PRINTING is done *only* when called for. No blank envelopes are fed without being printed.

COUNT is picked up on any machine function programmed. Statistical survey can be made as by-product of your addressing run.

SORT in either of two pockets can be based on customer activity you program. Inactives may be pulled while addressing is carried on, for example.

Mailing material of almost any type or size can be addressed by the Scriptomatic Model 101-S. A complete line of attachments is available to tailor Scriptomatic to your particular data writing needs. Discover how you can print from economical card masters . . . with *double* the flexibility . . . at *half* the cost . . . with the new Scriptomatic Model 101-S.

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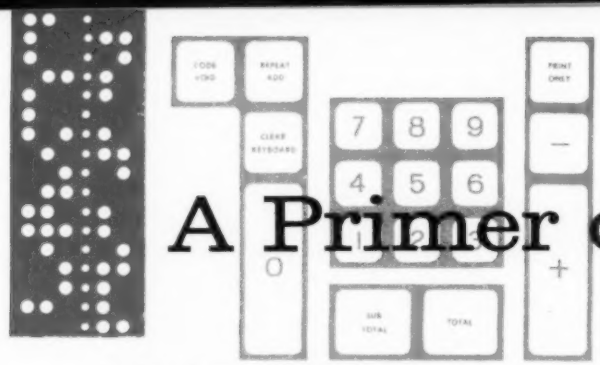

A Primer on Paper Tape

By James W. O'Connor

THE USE OF PERFORATED PAPER TAPE is prevalent enough today so that most readers probably recognized its pattern in the top border of this page. Information is stored on tape in the form of perforations whose patterns represent letters and numbers.

Five-channel tape is best known, and had its first widespread use, in the field of telecommunications. "Five-channel" simply means that there are five positions across the 11/16-inch width of the tape in which code holes may be punched, e.g., a single hole punched into the top channel always represents the letter "E" or the figure "3". Single holes in other positions, or various combinations of two or more holes, are used to represent all other characters and figures in similar fashion. Five-channels provide, in each column of the tape, the possibility of representing any one of thirty-two different characters; in the case of the familiar telegram these were at first the capital letters of the alphabet. Under this scheme the numbers, such as "5", were written out FIVE. Later a special character was used to denote a shift to either "Letters" or "Figures." Thus, illustratively, if L represents shift to letters and F shift to figures, an address might appear if decoded as L JOHN SMITH F 25 L EAST F 42 L STREET NEW YORK F 26 L NEW YORK. While the communications industry is committed because of the tremendous investment in equipment to five-channel tape, such awkwardness provides a major disadvantage for use in business operations.

In spite of this, nearly all commercial data transmission today—in addition to message transmission—utilizes the well-known Teletype terminal equipment which handles five-channel tape. Similar equipment, manufactured by Kleinschmidt Corporation, is used extensively by the Armed Forces. The information is transmitted over lines leased from A. T. & T. or Western Union.

Six-channel tape was introduced with the advent of the automatic typewriter—a typewriter that would type over and over again the same piece of correspondence under control of the tape. The sixth channel permitted additional codes such as a shift key to differentiate between upper and lower case. Paper tape is also used in certain automatic embossing of addressing plates.

Paper Tape as a "Common Language"

About four years ago, the concept arose of using paper tape as a "common language" for communication between conventional machines in the office. This was the birth of IDP—Integrated Data Processing—for which five-channel tape was and continues to be used. A variety of machines have been developed which produce a paper tape as a by-product of another operation; addressing machines, bookkeeping machines, cash registers, typewriters, etc. The tape can be automatically converted to punched cards which may then be processed by conventional tabulating equipment.

An eight-channel tape, produced by a typewriter used either by itself or in association with some other piece of equipment, was introduced by IBM. The use of eight channels has many advantages, the most obvious being that there are enough codes, i.e., enough combinations of punches, to provide for a great amount of flexibility, not only in the types of alpha-numeric characters, but also in programming, such as duplicates, eject, etc. The eighth channel also permits an error control by means of a parity test. For instance, the tape-perforating machine can place or not place a hole in the eighth channel so as to achieve an even number of holes across the eight channels. The next machine to utilize this tape can in turn check for this same parity.

A very typical application of the use of paper tape is in billing. As the order is prepared by means of a combination of customer tapes, product tapes and information inserted manually by means of a typewriter keyboard, a by-product tape may be created which has encaptured all of the pertinent information simultaneously being typed on the order form. A less general use is the point-of-sale creation of a tape, recording the details of the sales transaction.

Paper tape is being used directly as input for electronic computers. This provides the possibility of transmitted data being processed directly without conversion to another medium. For such computers the program of instructions itself is contained on paper tape. There is available today equipment for converting, in either direction, between paper tape, magnetic tape and punched cards.

Paper tape is also making a place for itself in the automatic factory. Controlling machines this way is not a new idea. The familiar player-piano achieved its musical results by means of holes

(continued on page 45)

Paper Tape in the Office

Punched paper tape—a good "work horse" — may be a useful data processing tool.

MANAGEMENT has never before been so overwhelmed with new machines, concepts and just plain gadgets as it has in the past few years. Indeed, if for no other reason, the place of systems in business organization has been secured merely to keep abreast with this surge called automation. By itself, the glamour of modern data processing and operations research concepts has given the specialists a field day. The inevitable leveling off period, however, has arrived. Those that can are doing it, and those that cannot are running out of words and excuses.

Management is looking beyond the blue sky for the payoff. It is no longer novel to have a punched card, punched tape or computer system; management wants an operative system. Of course, this observation is but an echo of several severe criticisms that have been voiced on this subject in the last year or so. Some of them are extreme, some of them are quite realistic. The purpose of this article is an evaluation of these opinions.

Paper tape should be used as a working media in office clerical functions. We are interested in its use right now rather than its possible use tomorrow.

By Robert Bittman

Many of us have looked down the punched paper tape road to data processing Utopia. Few have been able to travel very far down that road. It is a job just to start: hard work, plenty of planning, a real systems project. How far will we go toward this Utopia? Not all the way, we know that now. We should go just as far as it will pay off.

Another Office Work Horse

Punched paper tape is "work horse media" like the punched card, without the glamour of magnetic tape of optical scanning. Use it right and it can be profitable! How to use it correctly is a question that can be answered only in general terms for in the final analysis what is required is a specific systems study of your own problems. It is easy to point out misuse. Teletype networks are costly so you don't use them unless service and volume justify them. Master tapes are difficult to file, handle and change when thousands of items are involved, so you don't use them when the number of tapes becomes unwieldy. Tape-to-card conversion and computer input requires accuracy which may be difficult to control with excessive keyboard operations—be careful of this pitfall.

You must find out for yourself how to use or not use paper tape. In our company, we did just that. Our data processing application is typical: Order Billing. Our systems survey determined that our number of products, customer, order volume and service requirements were all suitable to "punched paper tapes." Our teletype set-up was already operative, our accounting was mechanized *(conventional tab equipment and a computer)* and our billing was centralized.

A proposed paper tape application presented the following advantages:

1. *Better, faster and more accurate transmission.*
2. *Elimination of many transcribing operations.*
3. *Tape to conversion for Accounts Payable inventories and analysis data.*
4. *Cost reduction.*

Up to this point our system work was relatively easy, but the work was by no means a simple task. We were obliged to establish complete Master Tapes on product line and customers. In order to do this, all forms related to the order and the billing had to be standardized. Every requirement of Sales, Production, Shipping and Billing had to be satisfied and yet fall within machine and form limitations.

Company Practice Dominates

Company and industry practice cannot be set aside by a data processing activity. The systems man who does not accept this still has a great deal to learn. This presents many problems. Tabulating lives by a code that is usually meaningless and unseen outside the machines; it must be put in the tapes along with several Card Converter codes. Where to key-board variables, when to print and punch or punch and not print, all adds to the complexity of planning for tapes and forms.

Our data processing originates with the order. A customer tape is inserted and certain variables added. The product line tape is likewise used with other variables. This is an off-line operation. The tape is sent out over our teletype to the plant. The plant receiving the tape prepares the order and shipping documents and sends back over the line a memo when the shipment is made. In our central DP office the new tape with an original is used to create a bill. All price extensions and footings are done on this calculating typewriter operation. The output tape of this operation goes to our Data Processing Department for tape-to-card conversion. Here the following reports are prepared with no added key punching operations; inventory, Sales Analysis, Accounting Entries for Sales, Cost Reports *(cost per unit)*, Accounts Receivable and several special customer and tax statements.

How well is the paper tape system working? It is now operative for a year. The advantages of speed and accuracy have been achieved and cost reductions have been realized. In short, punched paper tape can work and pay off if you put your money on the right horse.

■ ■ ■

Statistical Reports As a By-Product of Paper Tape

An increase in information available without a large increase in cost.

By Ellis Baker

THE MAJOR PORTION of the cost of obtaining statistics from punched cards has always resulted from the expense of punching the card in the first place. The machine accounting people have for years been hoping and working for a method to by-pass this expensive key-punching operation and the advent of punched paper tape as a by-product of creating the original document has been the first major break through in this problem. This has been doubly true in the case of a service organization operation where the cost of key-punching has detracted from its competitive position.

Now that so many companies have developed bookkeeping, billing and other accounting machines which produce by-product punched paper tape, val-

uable statistical data can be produced much more readily and inexpensively.

The varieties of statistical data available from punched cards produced by tape are virtually endless, but a few examples may be of interest:

- **Sales Analysis Statistics**
- **Overall Cost Information**
- **Perpetual Inventory**
- **Service Organization's Economy**

Sales Analysis Statistics

One of the most common statistical reports requested by management is the sales analysis. This enables the Sales Manager from a quick view of a monthly or weekly condensation of his sales figures to greatly increase the efficiency of his selling operation.

When invoices are prepared, a by-product punched paper tape for each invoice item can be produced. This tape may contain such data as customer identification, area identification, salesman, product *(which in turn may be broken down by styles, sizes, colors and other pertinent descriptions,* quantities sold, sales amount, discount, etc. These tapes are then automatically converted into punched cards; with this available data the sales manager can break down his sales history into any of the above categories or combinations thereof. These statistics may be summarized so that a year-to-date figure is available for the next month. Furthermore, in the following year a previous year versus current year sales figure can be shown.

With this data in the card we need not stop at sales analysis statistics. The very same card can be used for accounts receivable aging, commission statements and others. In the case of the accounting of various types of publishing and music forms, for example, the cards may also be used for royalty reports.

Overall Cost Information

Where tapes and then cards are produced as a by-product of accounts payable ledgers, statistics on costs by department and accounting ledger groups may be produced. These cards can be used further in conjunction with payroll cards, similarly produced, to produce overall cost statistics. These statistics can be broken down by department, job number, operation and other categories and for any service organization can be used for a basis of billing, which in turn brings us back again to sales statistics, accounts receivable, etc.

Punched tape created as a by-product of the preparation of freight manifests for a shipping or trucking company or the shipping operations of any company will yield valuable freight analysis statistics. The company can determine by voyage, trip, place of loading, place of unloading, customer or types of product the statistics which will enable it to more profitably direct its shipping operations.

Production control statistics are available from punched paper tape prepared as a by-product of work orders. The scheduling of work flow from department to department may be tabulated and this data can be combined with cards representing cost of material and labor to produce cost reports.

Perpetual Inventory

Using the tapes produced from sales and purchases combined, it will be evident that a natural statistical analysis would be a perpetual inventory which can be updated month by month or week by week, to keep management constantly informed on their inventory position both in terms of quantities on hand and value of inventory. It will be noted that a great many of these statistical reports can be produced from the same punched cards which produce other statistical reports. As this multiple use of the card becomes more prevalent, the cost of reporting is further reduced—thus the economy and efficiency of the method.

Service Organization's Economy

Particularly when these statistics are obtained from a service organization they represent a new found economy. Many clients send their tapes to service organizations for their statistical reporting. The tapes are easily transported and since the conversion into cards is automatic, the lag time between the receipt of final tapes and production of the report is shortened. Inasmuch as most statistical reports are run on a periodic basis, such as weekly or more often monthly, the machine usage required to produce the reports is relatively high for a few days and then drops to zero until the next reporting period. Thus, reports which require several punched card accounting machines, the cost of which might not be justified, may be obtained on a service basis at a very reasonable cost. ■

MECHANIZED INVENTORY CONTROL

"Office automation is going to open our next branch for us — and stock the shelves," says Almo Radio Company's president, Morris Green. Mechanized stock control now available through the use of a battery of IBM punched card electronic data processing machines has resulted in equalizing Almo's inventories in line with actual sales. Almo's move to office automation was largely at the urging of the Philadelphia Company's accounting department.

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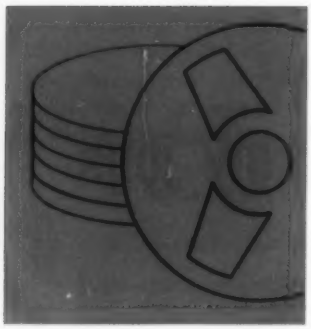

FILE MAINTENANCE ON MAGNETIC TAPE

With the advent of the electronic age more and more files are being kept on magnetic tape. Efficiency in this area presents some challenging considerations.

THE MAINTENANCE OF FILES kept on magnetic tape presents no special or unique problems—just the old ones slightly warmed over, well-hashed and seasoned with the fact that management has been conditioned to expect minor miracles from electronics. Furthermore, in any clerical system, the only common factor is that any procedure is directly a function of the personalities of the individual executive directing it. However, for even quite different file maintenance systems, the questions are the same even though the solutions may be different.

The purpose of a file is to have conveniently available for a number of similar items all of the information necessary to do a specific job. It is, however, necessary that the solution be both economical and practical, and we are, therefore, constantly faced with compromising the theoretical solution to one degree or another. In these compromises lie the differences between manual, punched card and tape file systems. It is interesting to note, however, that the differences are a logical projection of the trend we have been experiencing in moving from manual to punched card procedures.

Let us look at the basic considerations in a master file:

(a) *flexibility of format and procedure*
(b) *scheduling*
(c) *accuracy*
(d) *cost*
(e) *random access.*

By David M. Irwin

The Manual System

Under a manual system, we find that:

(a) We have an almost unlimited flexibility. We can use color codes, special notations, etc., to handle those exceptions which seem to arise in any line of business.

(b) The manual system demands a reasonably even flow of work, both as input and output. Unfortunately, most files have heavy peak load requirements leading to substantial inefficiencies in a manual system.

(c) The accuracy of a manual system is relatively poor in that clerical errors can and are introduced not only into the master record itself, but also in processing output such as bills. However, the familiarity of the individual clerk with all of the cases in his particular group leads to a check of reasonableness, often preventing an error from being perpetuated.

(d) The cost of the manual system is directly proportional to the number of items. As the file grows, the cost grows proportionately, leading eventually to an uneconomical operation.

(e) The manual system has *immediately available* all of the information on any portion of the files.

The Punched Card System

Under a punched card system we find that:

(a) There is a serious drop in the flexibility of the system. A given case must fit within a rigorously outlined pattern, or it must be handled at considerable cost outside of the system.

(b) The scheduling problem is appreciably simplified in that peak load productions, such as billing, can be handled by relatively high speed equipment.

(c) The accuracy of the system is appreciably improved. However, the fact that the output is not handled by a clerk with detailed knowledge of that particular case, means that if incorrect data is inserted originally or if the equipment makes an undetected error, the results can be disastrous. A machine does not necessarily question a dividend ten times the size of the premium.

(d) If the volume is sufficiently large, the cost per item can be substantially less than under a manual system. Furthermore, an increase in the size of the file does not produce an equal increase in the cost.

(e) While the information is theoretically available for each individual case, it may be separated between several files and many cards, and it is often difficult to answer individual random questions.

The Tape System

Under a tape system, we find that:

(a) Flexibility of the system remains about the same as it was under punched card procedures. Actually, there is some improvement in that records of greater length and complexity may be practical. However, a record is only as good as the use to which it can be put and while it is possible to keep a more complex record, the programming for using this information can rapidly become prohibitively difficult or too large for inclusion in the machine.

(b) The phenomenally high speeds of the equipment completely eliminate the inefficiencies formerly associated with peak loads. Indeed, these speeds, in combination with the high hourly cost of the equipment will, in many cases, make it desirable to schedule the processing as infrequently as possible, thus artificially manufacturing peaks.

(c) The internal accuracy of this equipment is extremely high. However, if you put the wrong information in you will get the wrong answers out. Indeed, never before in the history of man has it been possible to produce so many wrong answers in such a short length of time. Unlike the manual system, nobody will have sufficient familiarity with the individual case to spot inconsistencies. Errors once inserted are likely to be perpetuated indefinitely.

(d) Relatively large increases in volume can be handled with relatively small increases in cost.

(e) Information is completely unavailable except by machine interrogation. Very special steps have to be taken to overcome this outstanding inability of the equipment to answer a primary need in many files. Indeed the problem of random access dictates the basic characteristics of a tape system more than any other factor.

The Basic Problem Areas

In setting up an integral system built around a master file we seem to have three problem areas:

1. *Reference*
2. *Processing*
3. *Change*

1. Reference—The information in the master file is completely unavailable except through the machine. However, the high hourly cost of the equipment renders prohibitive the frequent use of the machine for interrogation rather than for processing.

2. Processing—The actual procedures by which the data is processed to produce output have become even more remote from the personal handling of input and output. It is, therefore, necessary to take extreme precautions in insuring adequate controls and more important, in setting up checks on the reasonableness of both the input and the output.

The high cost of the equipment together with its high speed make it extremely desirable to artificially peak the processing load so that we may have as few machine runs as possible.

3. Changes—Because of the lack of liaison between the machine operation and the input personnel, it is extremely important that changes receive a degree of editing previously impractical. Errors accepted by the system are likely to remain there ad infinitum.

As previously stated, the primary difficulty lies in the area of random access. The high cost of equipment makes it uneconomical to run large files for reference purposes only. The simplest solution of the problem is, of course, the running of a master file on a daily basis. However, if the activity of the file is less than 10%, the solution is expensive. There are a variety of other approaches.

An analysis of the cost of random access requests was made by a mid-western insurance company which showed that 95% of their random questions could be answered by an abbreviated (*ten digit*) master showing premium and loan information. Such an abbreviated file would be queried and up-dated daily while the master is run on some less frequent basis such as monthly or bi-weekly.

In our own case, we found it essential to establish a series of masters containing different information for different purposes. We have masters containing billing information, statistical information, claim information, premium historical information, commission information and eventually one containing a historical summary of all of these. The use of multiple masters unfortunately creates many difficulties. I personally refuse to believe that anyone who has ever done this has found two files to be in complete agreement.

(continued on next page)

Completely random access can be obtained by using the high speed available for printing purposes. It is not unreasonable to consider printing all the information available on the master file on a monthly or semi-monthly basis. The fact that one ends up with a staggering amount of paper is not particularly attractive, but it is not prohibitive either. A million lines of information can be printed in between 35 and 45 hours and will make a pile of tab paper approximately eight feet high.

This, of course, does not answer the entire problem, as one must assume a constant flow of changes to this information during the period between listings of the master. It is necessary to know not only the status of the master at the time of the last processing run but also to ascertain if there had been any changes since then. The accumulation of these changes can be either on tape or may be input accumulated in its punched card form. In either case, it would seem desirable to print this tape daily in the same order as the master file.

As a variation to this general procedure, it will sometimes be possible to incorporate the master list into the processing output; for example, we intend to incorporate a list of the individuals insured as part of our bill. Thus, we eliminate the need for a master listing of these individuals as a separate item.

From a procedural point of view, the simplest solution can be obtained by a change of the philosophy under which your company operates. All too infrequently, it is possible to eliminate random access between processing runs by refusing to answer questions on other than specified dates. Not only is this solution often impossible by competition or by law, but it is almost always completely unpalatable to management, and I, therefore, have not found it a solution. Nonetheless, it should be considered especially where it is practical to process the master file at least once a week.

At first glance, in the processing area, the only major change in consideration would seem to be in the area of scheduling. Because of the unbelievable processing speeds, it is practical to handle peak loads of almost any degree. Indeed, because the file must be handled in its entirety when any portion is run, and because the expense of passing data is almost as great as the expense of processing it, it now becomes desirable to artificially peak the load. However, as well as this somewhat revolutionary change in the scheduling area, the processing runs both can and must contain many more comprehensive checks on both the input and the output.

It is realized that practically all processing involves some changes in the master file. The use of multiple masters raises the problem of insuring that the change is made to all masters and that the appropriate action is carried out. We are striving towards an extremely complex master change program, whereby we could insert the bare details of the change once and once only and have the master change program call out from tape memory the appropriate action to be taken on each of the master files involved.

One of the basic principles which we recommend strongly is the elimination as far as possible of the necessity for coding information before inserting it into the tape system. Our own test samples show that just over half of the errors inserted into our more complex punched card procedures are errors in coding. Therefore, if we propose to make a simple change, such as altering the amount shown in a Life Insurance field, we will never try to define the physical location of that field, but will merely label it as "CHANGE LIFE TO 7500".

As well as using uncoded input, we are, of course, always printing out a register which shows not only the data replaced but also the final status of the information. This report receives a thorough check and we are full of hope that the simplified input, together with many additional consistency checks within the machine and the "before" and "after" print out comparison, has resulted in a degree of accuracy previously undreamt.

In Conclusion

Out of these many considerations, only one conclusion can be drawn. The solution to a particular problem must itself be unique. Each system has its own requirements dictated by the random access requirements, the size and complexity of the record, the frequency of processing, the percentage of activity and the length of the programs. In our own case, the size of the record dictates split masters; the urgency of random requests dictates a master print out; the complexity of the record dictates separate changes; and our lack of experience calls for prayer. ■

A.M.A. COURSE INCLUDES SIMULATION EXERCISE

Emphasizing the non-technical as well as the technical aspects of the systems function, the American Management Association offers its Systems and Procedures Course in three units of a week each, spread over a period of approximately three months. During breaks between units, registrants are asked to practice the skills presented and apply them to their own daily work. The latter part of Unit III is devoted to a simulation exercise to give participants realistic practice in setting up the systems governing the flow of data and decisions among the various units of a complex company. A.M.A. uses its IBM 650 computer for this business simulation. The meeting dates are: February 2-6 and April 20-24, Unit I; March 2-6 and May 18-22, Unit II; April 6-10 and June 15-19, Unit III.

The Human Relations Aspect of Electronics

There is no reason to fool some of the people even some of the time.

EACH PERSON REACTS DIFFERENTLY to the subject of electronics. Some are impressed by its speed, flexibility, cost, etc. Others think of the uses to which it can be put —new tasks, present tasks done better, tasks that need no longer be done. Still others react more to the jobs it will create, the workers it will eliminate, the new tasks to be learned.

The interest in electronics, therefore, seems to boil down to three basic areas: the equipment; its application and its effect on people. When we talk about the equipment and its application, we cannot but also talk about people and their jobs. Electronics is permeated with human relations problems, either emotionally or factually. Such things as security, personal dignity and resistance to change are older and more powerful than any single scientific advance.

The Equipment

It is the equipment area that has received a considerable amount of attention and publicity. It is fascinating to hear about electronic data processing equipment's tremendous speed and flexibility and the canny way the machines can read, write, figure and "remember" data. Too much emphasis on the hardware itself, without a thorough study of its application to specific operations, gives the businessman and the worker the wrong impression about the equipment. The glamour and fascination is easily turned to fear—fear of the high-priced technicians necessary to operate the equipment, fear of its impact on employment, the horror of the "push-button" office.

We don't realize sometimes that the average businessman just wants to use the equipment—not build it. He need not be concerned with the inner workings of the machine no matter how glamorous it might sound. More emphasis should be on what it will do rather than how it does it. Not until this is done will the fears and misconceptions—yes, and the glamour—be satisfactorily replaced by factual understanding.

Applications

Many companies are now using electronic data processing equipment in their office operations. Nevertheless, much more experience must be gained about its application before the true impact of the equipment on costs, procedures and jobs is known. A great deal of what is being said is still speculative.

Once a decision is made to use an electronic computing system on an office operation, a tremendous amount of work remains to be done before the new equipment can be put into use. Machines must be told what to do in minute detail. Proposed routines must be spelled out in great detail and new jobs designed. Nothing can be overlooked. A considerable amount of planning, together with decision-making is necessary. Special rooms have to be designed and constructed to house the equipment. All of this is very time-consuming.

Fears And Misconceptions

Now, let's explore the impact of electronic data processing equipment on the office worker—the human relations aspect of electronics. Much is being written about the impact of automation or electronics, on employment. Based on the assumption that electronics in the office and the factory is going to result in the laying off of large numbers of people, or going to reduce the requirements for the adding of help to a considerable extent, attempts are being made to justify electronics as a technological improvement.

By J. Douglas Elliott

We all know that in the long run technological improvements increase productivity. We know it is necessary ultimately to create more jobs, shorten working hours and increase our standard of living. We also know that any possible improvements are justified by the great increase in clerical costs in recent years. But favorable reaction to such generalities changes rapidly when one as an individual, is confronted with the problem.

The fears or misconceptions of the average worker and the public, for that matter, concerning electronic systems seem to break down into four areas:

1. That these new electronic brains will become the masters of men, reducing the worker to a subordinate position;
2. That only a few high-priced, highly educated specialists or technicians will be necessary to set up and operate the machines;
3. That those workers who are still needed will lose their individuality, they will become robots with their jobs reduced to simple, repetitive tasks; and,
4. That layoffs will result when electronic systems are installed.

But the picture isn't quite as bad as it is portrayed—in fact, much of this thinking is entirely false. Nevertheless, due to the emotional aspects of electronics, poor communications and lack of acceptance *(which is a human trait)* of something new, many people have not been relieved of these basic fears.

Machines — The Masters Of Men?

Electronic office machines now available are extremely capable pieces of equipment. In spite of their great speed, flexibility and capabilities, however, they are more limited in many respects than existing standard office machines. As machines become more flexible, they are more dependent upon human preplanning to tell them what to do and less dependent on people to operate them.

Much is said about the memory of these machines. Yet they can only remember what they are told to remember and reveal what they are told to reveal. Some advanced machines can store or remember hundreds of thousands of bits of information, but we are told that the human brain has the capacity to store billions of bits of information. Man-made machines cannot replace human brain power as they have already replaced muscle power. This is what Thomas A. Edison had to say about machines long before so-called electronic brains were conceived, "Whatever the human mind can create can also be controlled by that mind, given enough time and encouragement."

Highly Skilled Specialists

If these extremely capable and complex machines will do all these things for man only if they are told what to do in the greatest detail, will not a staff of experts be needed to tell them what to do and to operate them? This leads us to our second fear or misconception.

The satisfactory operation of an electronic system will depend on groups of people to review and analyze jobs for the machines to handle *(the procedure analyst)*, to tell the machines what to do in their own language *(the coder)* and to operate them *(the machine operator)*.

In order for the machines to do a completely automatic job, as has already been stated, routines and procedures must first be broken down in the most complete detail.

The type of knowledge needed for the procedure analysis phase of this job *(existing routines, company policy, etc.)* can best be acquired on the job over a period of years. The coding phase *(converting established detail to machine language)* requires a knowledge of how the machines operate and what they will do and a rather thorough knowledge of the symbols and codes the machines understand. A sufficient amount of this specialized knowledge to do a satisfactory job can be obtained in a short period of specialized training such as is offered by the equipment manufacturers.

It is quite logical, therefore, for a company to use its own methods men, supervisors, or other key people who are familiar with routines and company policies and to give them the detailed training needed. The training of an outsider to do this job would be more difficult and take much more time.

The value of highly skilled specialists, either recruited from within or outside of the organization should not be completely disregarded.

The significant fact, however, is that the bulk of the programming staff can and should be made up of properly selected people from within the organization, and that the need for personnel with professional status is not a "must" in programming normal office operations.

Once the system is completely designed for the electronic equipment, the size of the programming staff may be lessened. A permanent group of programmers will always be necessary, however, to continually review the program for improvements and to make modifications necessary as changes in procedure or policy are made. An occasional rewrite of the entire program will probably be necessary.

The duties of the operators of the electronic equipment, except for the console operator, are no more difficult than those of good punch card equipment operators. They are required to select the proper group of tabulating cards or magnetic tapes, place them on the machines, remove them when the job is completed and file them away. They are expected to schedule their work so that the machines can be run steadily, make certain checks to ascertain whether the equipment is performing satisfactorily, and so on.

There are many fully installed electronic systems to date being used for scientific purposes requiring professional men to conceive the problems to be performed. This, together with over-emphasis on the equipment itself, has contributed to the common belief that highly skilled professional men are invariably needed to plan work for the machines and to operate them. In a normal office installation using an electronic system, there is little more need for an electronic or electrical engineer than there is for a mechanical engineer in an office using typewriters and adding machines.

Loss Of Individuality

Present mass production and highly specialized clerical operations, as well as key driven and tabulating card equipment, have created many repetitious and monotonous jobs which require little creative thinking or

initiative on the part of employes. Many people, therefore, assume that further automation of office procedures will increase this sort of thing, reducing the office worker to a mere robot.

As has already been pointed out, large electronic machines can most profitably perform voluminous tasks repetitive in nature. Is it not more natural then to expect the majority of tasks to be eliminated by this type of equipment to be those simple, repetitive and monotonous in nature? This is just what happens. In addition to reducing the number of mediocre jobs, these new machines will bring new jobs needing much creative thinking, initiative and responsibility.

The use of large-scale electronic data processing equipment, we are finding, has a tendency to require the consolidation of many closely related clerical tasks resulting in enlargement of the jobs of several clerical workers. Therefore, we can expect employes to feel more, rather than less, important as individuals as the result of using this equipment.

Employe Displacement

The fear of wholesale layoff of workers due to the installation of electronic machines is not as easily dispelled as the other factors discussed. The problem is a real one, but it takes a little analyzing to evaluate its seriousness.

The more we learn about these machines, the more we become aware of the fact that it is going to (1) *take people to tell them what to do;* (2) *take people to get work ready for them;* (3) *take people to operate them; and* (4) *take people to interpret the results produced.* These four steps can be termed the planning phase, the make-ready or input phase, the data-processing phase and the output phase.

1. The planning phase, the work performed by the programmers, has already been covered. These men or women are equivalent to present methods men and machine set-up men. There will be an increase, not reduction, of personnel.
2. At present, offices have people to record source data either in long-hand, by depressing keys on a machine or by key-punching tabulating cards. An electronic system must also have a number of employes to get source data into a form acceptable to the electronic system. One cannot expect any saving in the number of employes in the input phase, as source data must be assembled regardless of the system.
3. The greatest economies will undoubtedly come in the actual operation of the system, the data-processing phase. Although electronic systems will save floor space, speed up operations, replace existing mechanical equipment, and the like, the real savings in the average large office will have to come in labor to offset additional investment or rental of equipment. Though the displacement of personnel in this data-processing phase will by no means ever be complete, this data-processing phase of operation is the area in

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which the displacement of employes will be the greatest.

4. The output phase of operation, like the input phase, has not progressed technologically as rapidly as has the data-processing phase, though progress is now being made. Furthermore, the volume of printing to be done may actually increase in a complete electronic office system. Nearly all the information now maintained in readily accessible visual records would be maintained in magnetic or paper tape form. However, the information would be contained in a form understandable only to the electronic system. The reduction of labor requirements resulting from the technological improvements in printing machines may not, therefore, offset the extra labor requirements to print-out all needed information. We may actually see an increase in requirements.

After reviewing, the four phases of operation—planning, input, data-processing and output—it becomes more apparent that the completely automatic office made up of only sexless and shapeless machinery will not become a reality. Actually, there are still going to be a lot of people around. Any real savings seem to be confined to the data-processing phase.

Employe Relations Problems Facing Us

If man is still to be the master of the machine, if permanent outside technical specialists are not needed, if jobs are going to be broadened and made more interesting and if the reduction in personnel requirements will be smaller than anticipated, what are the problems facing us?

The problem of the "surplus" employe is still with us. It will be lightened somewhat, however, by the fact that many companies, in anticipation of an eventual shift to electronics, will streamline and mechanize many of their operations to get their "house in order" for electronics. This will spread the reduction of their force over a long period of time.

No company can afford to be naive enough to expect all of their human relations problems to be resolved by issuing a statement that no one will be laid off as a result of the installation of electronic equipment. This is a help to be sure, but it doesn't solve the problem, as will be pointed out.

In addition to those employes whose jobs are eliminated by electronic equipment, many more employes' jobs will be directly or indirectly affected by the installation. Many employes will find the duties of their job changed entirely or in part; many will find themselves working for different supervisors in different departments. This shift or displacement of employes may well affect two or three times as many employes as are made surplus.

In spite of the fact that the shift of responsibility will result in a higher pay rate for some employes, many will be considerably upset by having their status quo disturbed. The problem regarding the employe who must be assigned to different work and the problem regarding the surplus employe are just one problem of greater magnitude.

The selection of people for new jobs is a continuation of the same problem. A multitude of employes must be trained on clerical assignments before, during and after the transition to the new system. Many key employes will have to be temporarily assigned to the job of programming. Other experienced employes must be recruited to temporarily perform the extra clerical and machine tasks necessary during the transition period from the old to the new system. Replacements for key employes transferred to the programming and conversion staffs must be selected. This is what brings about the temporary increase in the over-all work force which adds to rather than detracts from the problem of excess employes when the conversion to the new system is complete.

Much advance time and effort must be given to the technological aspect of conceiving and installing a complete electronic system. Too often, however, the human side is overlooked until trouble develops. Then the time that should have been spent in evaluating the human relations problems involved, in getting essential information across to the employes, in keeping open the channels of communications up the line as well as down, and in training employes, is spent several times over in mending fences. This was particularly true during the Industrial Revolution of the 1920's. Today we know more about human relations—we recognize the need for giving attention to the employes as well as to the machine.

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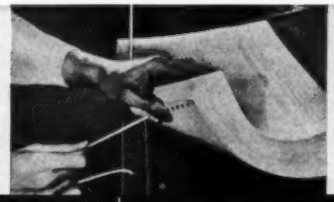

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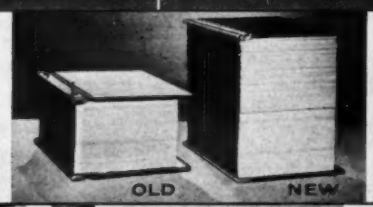

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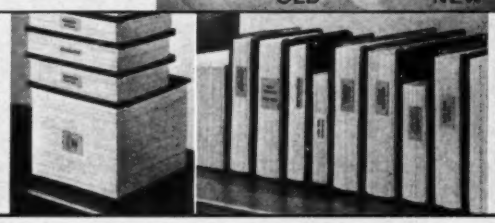

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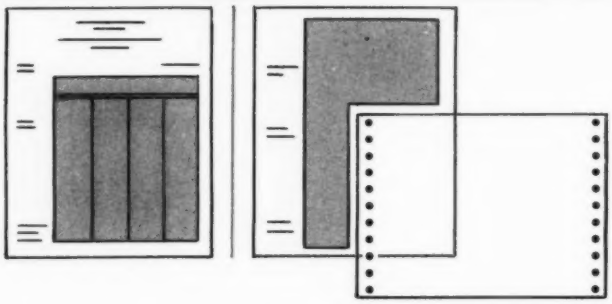
FORM DESIGN



OUR BUSINESS WORLD, as we know it, could not function without the use of printed forms. Every business of every kind finds that its very life's blood flows through the arteries of business forms. Purchase Orders, Acknowledgments, Sales Slips, Invoices, Statements, Ledgers, Production Orders, Requisitions, Report Forms — in fact, every operation of business moves on and is guided and controlled by a *business form*.

The trend in today's up-to-date office is towards beauty and efficiency. Office equipment, from the most modern electronic machines to the little-noticed office furniture, has been modernized and streamlined for improved appearance and increased efficiency. Business forms are essential tools of management. Their value can be increased in proportion to the improvement of their appearance and the increased functional efficiency of their layout. In other words, they should be properly designed.

What is Form Design? Form Design is the arrangement of lines, data and other printing contained on a business form. It is the efficient presentation of a business record, method or system comprised of two factors: *appearance* and *best possible layout*. It must provide for easy and economical use, whether hand written or machine written. It must be designed with the full knowledge of the abilities and limitations of the equipment on which it is to operate.

Appearance

Let us look at the first part of Form Design — appearance. The appearance of your business forms will reflect your own ideas of attractiveness within certain standards. Even the selection of the type faces can be indicative of your business. For example, you would not use the same size and style of type for a company handling heavy equipment and one specializing in dainty lingerie. Where possible, incorporate your trademark or sales motto on all external forms for additional sales value.

Explore the advantages to be gained by using rich, deep colors of ink and colors of paper as contrasted with the usual black and white. If possible, follow a general pattern for the corporate name on your letterheads, invoices, statements, etc., for advertising value. All around you, you see the trend toward beauty. Your business forms should be as attractive and up-to-date as this year's styles.

The Best Possible Layout

The second and most important part of Form Design covers the best possible layout for the form in question. After you have decided on the attractive appearance of your business forms, test them for correct functional layout. Under this heading will come all the established rules and ideas covering the design of all business forms. All will not apply to every application but one yardstick can always be employed — can the efficiency of this business form be improved by a different design or layout?

Business forms, in general, are either hand written or machine written. If the forms are hand written — record books or autographic registers — is the layout related to the order of the source material? If the forms are machine written, are they efficiently designed to meet the machine specifications? Are your forms, after completion, handled through auxiliary equipment? If so, have all the machine specifications been followed?

Knowledge of Systems

Form Design presupposes a knowledge of systems and takes into account such elementary considerations as correct size, number of parts, type of form, etc. It also includes correct weight and grade of paper, realizing the amount of handling, filing and permanency required. The proper selection of grades, weights and colors of carbon paper should be determined.

Is the information on the form in question copied in whole or in part to another; if so, in what order, why? Can the addition of an extra copy eliminate a rewriting operation with the attendant chance of error in transcription? Or, can one copy be so designed that it does the work of two copies, thereby eliminating one part or copy with the resultant reduction of costs? Should one-time carbon, automatic carbons or other reproducing agents be recommended? Is there information which must be eliminated from certain parts? Have you explored the various methods to accomplish this —blockouts, cutouts, short carbons, short sheets, masking shields, and the like?

These are but a few of the general questions that come up in the design of an office form. There are hundreds of others but these should serve to illustrate the factors and thoughts behind Form Design.

Everyone realizes the value and necessity of business forms. Are your business forms fulfilling the functions for which they are used? They are your tools of management. Are they operating efficiently for you? Put them to the test. Are you proud of their appearance or just tacitly satisfied? Can they be improved functionally? Investigate Form Design.

■ ■ ■

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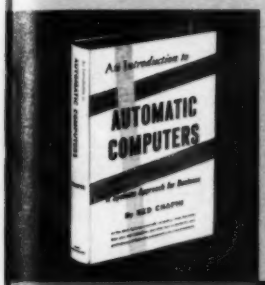

Many of these books belong in your library. Collectively they cover virtually every phase of this dynamic field. They have been written and edited by the leading authorities in industry and science and produced by the leading publishers.

We have carefully selected these books to recommend to our readers and have made special arrangements with the publishers so that you may obtain as many of these issues as you wish from us, examine them free for ten days —keep only those books which you feel that you need.

AN INTRODUCTION TO AUTOMATIC COMPUTERS, Ned Chapin, 544 pages, $6.75.

This noted authority fully answers the specific questions that are most important to business students. What is an automatic computer? What can it do? How does it function? How is it programmed and operated? How can the need for a computer be pinpointed and its use justified?

INFORMATION PROCESSING EQUIPMENT, M. P. Doss, 280 pages, $8.75.

Covers latest developments in such media as electronic and automatic typewriters, calculating machines, stencil and hectographing equipment, collating machines, lens-less copying with sensitized paper, microcopying, punched cards, machines for handling numerical data, and many others.

THE OFFICE IN TRANSITION, Esther R. Becker and Eugene F. Murphy, 190 pages, $4.00.

Based on the experiences of offices in which the transition to automation has been successful, this volume describes the human and technical problems that arise. Particular attention is given to the sociological aspects inherent with the introduction of automatic office techniques.

DIGITAL COMPUTER PROGRAMMING, D. D. McCracken, 253 pages, $7.75.

This new book accomplishes two important tasks for users and potential users of computers. It discusses the practical aspects in working with these machines and secondly, it gives a lucid picture of the fundamentals upon which this fast-growing field is built. A key feature is the mythical computer called TYDAC, devised by the author to illustrate principles and techniques.

INSTALLING DATA PROCESSING SYSTEMS, Richard G. Canning, 193 pages, $6.00.

This book takes a realistic approach in non-technical language. The author assumes the reader is relatively unacquainted with electronic computers and mathematics. It shows the wide variety of problems that can arise when installing an EDP system. It makes a special point of fitting EDP into overall management improvement.

INTRODUCTION TO OPERATIONS RESEARCH, Churchman, Ackoff, and Arnoff, 664 pages, $12.00.

This is the only available introductory text on Operations Research. It emphasizes the method of approaching research from a scientific viewpoint and stresses the importance of defining management problems in terms of objectives and of administration of O.R. Contains numerous lucid case examples.

COMPUTERS, THEIR OPERATION AND APPLICATION, Berkeley and Wainwright, 376 pages, $8.00.

Down to earth information on exactly how computers work and what they can do, including such important considerations as computer reliability, advantages, limitations and maintenance.

ELECTRONIC DATA PROCESSING FOR BUSINESS AND INDUSTRY, R. G. Canning, 322 pages, $7.00.

Answers the major questions in management's mind about the field of electronic data processing by discussing the application of digital data processing devices to business clerical functions. The reader does not need any previous knowledge in this field for the author writes for the layman. The company is studied as a united operation which works toward a goal set by management.

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PITNEY-BOWES NATIONAL CHECK SORTER

A check sorter which is one of the units in a new bank automation system is demonstrated by Virginia Glaser for Stanley C. Allyn, chairman of the board of The National Cash Register Company. The machine sorts checks approximately 15 times faster than present methods and was developed jointly by Pitney-Bowes, Inc., and NCR. The General Electric Company supplied the electronic reading mechanism for the sorter. (The detailed item which described the sorter in the November/December issue was incorrectly shown with the NCR Post-Tronic, another unit of the NCR bank automation system.) ■

NEW UNIVAC COMPUTER

Remington Rand's New Univac Computer, a magnetic amplifier, solid-state commercial data-processing system, has been announced in the U. S. The computer is already in operation at the Dresdner Bank, Hamburg, Germany, where it is handling the entire range of bank functions. The equipment will rent at $6,950 a month with a purchase price of $347,500. Deliveries in the United States will begin in June, 1959.

The term "solid-state" refers to the fact that a variety of devices such as Ferractors, transistors and magnetic cores are used. Solid-state design has many advantages: less space, less power requirements, no air-conditioning.

The new computer is extremely fast. Card reading on both the card reader and the read-punch unit proceeds simultaneously, as well as simultaneously with punching on the read-punch unit and processing within the central processor. Its on-line high speed printer operates at a rate of 600 lines a minute.

Programming has also been simplified, through the possibility known as Flow-Matic coding. ■

ROYAL McBEE KEYSORT TABULATING PUNCH

A machine for automatic data processing utilizing flexible, low-cost Keysort punched card procedures has been developed. The Keysort Tabulating Punch is an adding, printing punch which automatically punches and tabulates quantities and amounts in Keysort cards.

Data is entered from a simple 10-key adding machine keyboard. It is simultaneously code-punched in the body of the Keysort card accumulated in the machine. All amounts print on the adding machine tape. The Keysort grooves punched along the edge of the card are unaffected.

After the cards have been Keysorted into desired classifications, they are tabulated by the same machine which senses the quantities or amounts, and automatically adds, non-adds or subtracts as required, printing the results on the detail tape.

Two quantities or amounts may be punched simultaneously. Indicators permit selective punching, sensing, etc. Figures of up to ten digits can be read and processed—totalling capacity is eleven digits. Royal McBee Corporation, Data Processing Division, Westchester Ave., Port Chester, N.Y. ■

PLAS-TA-CARDS

Wassell states that Plas-Ta-Cards, plastic punched cards, are still in good condition today after as many as 300,000 passes through tabulating machines. Wassell Organization, Inc., P.O. Box 390, Westport, Conn.

■

DYKOR METALLIC TAPE CLEANER

The Dykor Metallic Tape Cleaner cleans and relubricates magnetic metallic tape. An end-of-tape sensing device halts operations at the end of the cycle. The tape is automatically relubricated during rewind. The machine is designed and constructed to operate continuously. Digitronics Corp., Albertson, L.I., N.Y. ■

MONARCH "PLANNING AID"

The Monarch "Planning Aid" is an invaluable tool in planning the space layout of a punched card or computer department. On a heavy, flexible plastic grid scaled ¼" to the foot, die-cut templates with a pressure sensitive adhesive may be applied. Price: $2.50. Monarch Metal Products, Inc., New Windsor, N.Y.

■

TIME RECORDER AND TOTALIZER

The Time Recorder and Totalizer is a clock with a relay that may be attached to any punched card machine to measure actual running time. This device is valuable in evaluating the effectiveness of machine utilization. Standard Instrument Corporation, 657 Broadway, New York 12, N.Y. ■

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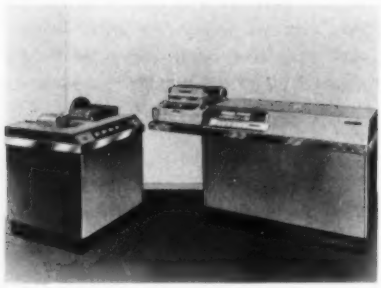


ROYAL McBEE LGP-30 AUXILIARY INPUT-OUTPUT SYSTEM

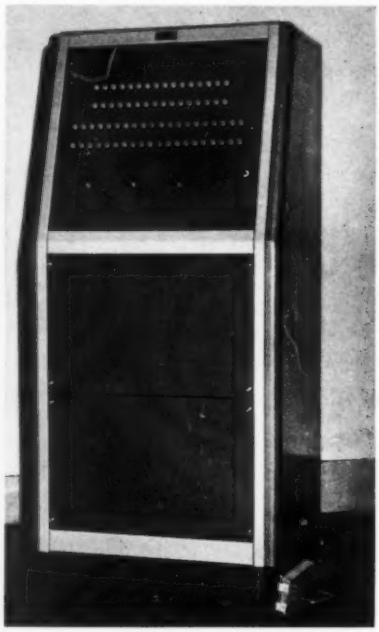
A new auxiliary input-output system is available as optional equipment for the LGP-30 electronic computer. Designed for applications which involve a large quantity of data to be processed, the new equipment is available as a combination high-speed punched paper tape Reader and Punch, or as a Reader alone. Royal McBee Corporation, Data Processing Division, Westchester Ave., Port Chester, N. Y. ■

CHARACTER READING EQUIPMENT

Dual Code Perforation is a new language for bank automation. It combines humanly and machine-readable perforated characters intermixed with perforated five-channel code. It is claimed that Perf-O-Data equipment for coding, reading and sorting documents will be priced considerably less than other character reading equipment of equal speed and advancement—of particular interest to the small bank.

The Dual Code Perforation is completely compatible with magnetically coded items. The perforations are applied at the top of the check so that they will not interfere with any magnetically coded data applied along the lower edge. For high-speed systems, a photo-electric reader capable of reading in excess of 40,000 digits per minute will be available.

The first delivery of this equipment has been made to the First National City Bank of New York to process installment payments. Cummins-Chicago Corporation, 4740 North Ravenswood Ave., Chicago 40, Ill. ■



SELECTOR EXPANDER

The WROC 452 is a self-contained unit containing its own integral power supply and flexible control panel designed to expand the co-selector, pilot selector, digit selector and emitter capacity of IBM tabulators. This machine has been designed to fill the frequent need for additional selector capacity.

The 452 contains 32 five-position selectors, four individual multi-transfer selectors consisting of 10 transfer rows and one common row, each row having 10 positions, and a 100-position, two-column digit selector which has the ability to convert numerical information from two separate card columns into a single indicative pulse.

This auxiliary machine may be coupled to any IBM Tabulator without affecting or altering its normal operation. Management Assistance, Inc., 40 Exchange Place, New York 5, N.Y. ■

BINDERS FEATURE NYLON POSTS

Cesco loose-leaf binders for marginal punched forms are available with nylon post binders. The use of a continuous nylon cord, together with a permanent locking mechanism, should offer greater permanency of binders. C. E. Sheppard Company, 44-01 21st St., Long Lsland City, N.Y.

■

MECHANICAL READING "EYE"

The "Eye" is a machine for reading a language that is also intelligible to the human eye; it is a character-sensing system utilizing a scanner which converts images of numerals into video signals which are "read" by a small special purpose digital computer. It can "read" cashier stubs and punches cash application cards in cash accounting for utilities and other businesses; punched cards are turned out from typed stubs at the rate of 100 a minute.

The common language, read by the machine as well as by human operators, is called "Selfchek." It is a type face for typing cash amounts in simple Arabic numerals, using special type wheels in the conventional fashion on business machines. Imperfectly printed numerals can be rejected by the machine for later checking. Stubs whose amounts have been manually lined out with pencil, perhaps to indicate that they were not paid as billed, can also be automatically rejected.

This new machine may find application in rapid billing for utility, gasoline and magazine subscription accounting offices where millions of cash or credit transactions must be cleared in the shortest possible time. Intelligent Machines Research Corp., 7019 Edsall Rd., Alexandria, Va.

PACKAGED AND CUSTOM DATA PROCESSING PROGRAMS

Many companies, colleges and individuals are interested in initiating training or orientation programs for management and operating personnel in punched card, punched tape and computer areas.

Beseler Training Associates assists colleges and corporations in the design of training programs, comprising extensive visual presentation, an instruction outline, student handbook

and text materials, including quizzes and examinations.

The visual aids include overhead projection and transparencies as well as film strip and slide projection techniques. Flannel board and magnetic board devices have been cleverly designed to illustrate operation of moving parts of equipment. The animation of these presentations is cleverly performed in such a way that it is hardly essential that students be concerned about the lack of actual equipment present in the classroom. This training is provided at all levels and for varied lengths of time depending upon the needs. Beseler Visual Products, Inc., 210 East 23rd St., New York, N.Y. ■

pdp/DATA INTEGRATOR

The pdp/Data Integrator is an off line auxiliary machine for producing a paper tape which combines existing data punched on cards, new data entered from its keyboard and other data such as time, external count, etc. The standard model produces five-channel tape, but models for six, seven, or eight-channel tape are available. There are two feed receptacles for fixed data input from cards. Punching of Continental time in four digits may be automatically performed when the strike bar is operated. Error safeguards are provided. Taller & Cooper, Inc., 75 Front St., Brooklyn 1, N.Y. ■

HIGH-SPEED ELECTRONIC ADDRESSING DEVICE

Hundreds of companies send out mail in the astounding volume of hundreds of thousands per day. For these people, addressing by conventional punched card methods and by addressograph plates has been satisfactory for many years. However, lower cost and more effective means of addressing these great volumes have been developed through printing which is truly electronic. By definition, electronic printing eliminates the movement of a mass of metal towards a piece of paper. This concept of impactless printing of addresses infers higher speed. This speed is limited mostly by the ability to move paper quickly.

The latest device in Addressograph-Multigraph's electronic facsimile printing development reads optically from printed data and reproduces this on a strip of addressing tape at a density of 10,000 spots per square inch. The printing takes place by styli which are 1/100ths of an inch apart. This printing is performed by passing electrical impulses through a strip of dampened paper tape to cause a chemical reaction. The dampener is simply a saline solution and needs no carbon or other supplies which a conventional impact printer requires.

It prints in the neighborhood of 25,000 to 40,000 addresses an hour, a rate perhaps five or six times that of its mechanical counterparts. Its cost is in the $50,000 range. Addressograph-Multigraph Corp., 444 Fifth Ave., New York, N.Y. ■

IBM SERIES 50

The announcement by IBM of the Series 50 equipment is of considerable importance to the field of data processing because it will probably more than double the potential number of punched card users.

For this reason, the IBM Series 50 announcement might well become the big event of the year in office automation. The following table spells out the equipment capacities and monthly rentals.

This new low-cost punched card equipment will be available for installation in March 1959. A basic installation, comprised of a sorter, accounting machine, and keypunch, will rent for as little as $270 per month.

The low-cost equipment performs the same basic accounting and statistical functions as the largest punched card systems; the main difference is in volume of output and production rate. The machines are re-engineered versions of the 402 accounting machine, 514 reproducer and 602A calculator. A growing company may convert from the Series 50 line to the larger punched card line at any time with no conversion problems. IBM Data Processing Division, 112 East Post Road, White Plains, N. Y. ■

LOW-COST PUNCH VERIFIER

The Synchro-Monroe Card Punch Verifier is a low-cost machine to be used in conjunction with an IBM 024 or 026 Card Punch to do a verification job with no operator effort. It automatically prints and accumulates amounts to a total while cards are being punched. At the end of the punching routine, the operator simply checks the pre-list total against the Synchro-Monroe total. The operator performs the normal punching routine up to the point of visually checking the total.

Under X and Y control, it will automatically add, subtract or non-add, according to the coding from any field or fields. The Synchro-Monroe does not interfere in any way with the routine function of the card punch. Monroe Calculating Machine Company, Inc., Orange, N.J.

■ ■ ■

IBM SERIES 50	SPEED	MONTHLY RENTAL
Keypunch	Normal	$ 35.00*
Sorter	450/minute	40.00*
Type 514 Reproducer	50/minute	70.00
Type 602A Calculating Punch	65% of normal	180.00
Type 402 Tabulator		
55 typebars; 56 counter positions	50/minute	195.00*
73 typebars; 56 counter positions	50/minute	220.00
88 typebars; 80 counter positions	50/minute	255.00

These three pieces of equipment are considered to be minimum requirements.

MICHIGAN PROFESSORS TOUR U.S.S.R. COMPUTING CENTERS

Two University of Michigan electronic computer experts are back from a lecture tour of Soviet Union computing centers and universities.

The travelers, John W. Carr, III, associate professor of mathematics, and Norman R. Scott, professor of electrical engineering, visited Moscow, Leningrad and Kiev.

Their impressions: The United States is still ahead in many phases of the important field of electronic computing, but the Russians aren't far behind.

Carr and Scott, along with two other U. S. scientists, were guests of the U.S.S.R. and Ukranian Academies of Science. The trip was a return engagement. In June, four Soviet mathematicians and engineers were invited to and attended the University of Michigan as lecturers at the annual Special Summer Conference on digital computers.

The Russians, apparently, lag somewhat behind in practical computer applications and Scott, in at least one instance, questioned *"quality control"* in construction of a new computer.

Both Professor Carr and Russia's Dr. Ershov of the Moscow Computing Center are especially interested in advanced programming — providing the computer with information in a form which it can use to solve problems.

Programming involves stating the problem in language that can be efficiently translated by the machine.

"In this field the Russians are well advanced," said Carr in a report following the trip. *"Another type of programming, linear programming, being done at Leningrad has proved to have many applications, especially in solving complex problems in the oil industry."*

"It has also been used in the railroad and timber industries," he added.

For the scientists — U. S. and Soviet alike — the most important achievement of the trip was the establishment of closer ties between themselves and their countries.

"All of the Russians we met were interested in exchanging reprints of technical papers dealing with progress in computer research in the U.S.," said Carr. *"Of course, we also expressed interest in having reprints of their work."*

PEOPLE AND PLACES

RCA NEWS

JOHN E. JOHNSON has been named Manager of the Marketing Department, Electronic Data Processing Division of the Radio Corporation of America. He will make his headquarters at Camden, N. J., and will be responsible for all matters pertaining to the sale of RCA electronic data processing systems. Mr. Johnson previously served as Marketing Vice-President of the Datamatic Division of the Minneapolis-Honeywell Regulator Co. A native of Kansas City, Mo., Mr. Johnson started his long association with data processing equipment at the Burroughs Corporation plant in that city.

G. W. TUNNELL has been appointed to the position of Manager, Broadcast, Systems and Shop Repair Service Sales for the RCA Service Company. Mr. Tunnell will be responsible for installation and service sales for several equipment lines, including electronic data processing equipment. He joined RCA in 1940 and has since served in various manufacturing and engineering capacities.

AIR FORCE GIVES RIBBON COMMENDATION

LAWRENCE A. CONNELL, formerly with the Air Force, and now a sales technical representative with the Burroughs Corporation's ElectroData Division, has been presented with a Commendation Ribbon for his work in converting Air Force personnel accounting procedures from conventional punched card equipment to electronic data processing equipment.

FLOFILM GETS NEW SALES MANAGER

MICHAEL M. HARRIS has been appointed as Sales Manager of the Flofilm Division of Diebold, Inc. Immediately prior to joining Diebold, Mr. Harris was a management consultant. He is a graduate of New York University and was for eleven years with Remington Rand as a sales manager for the company's Business Machines Division.

PHILCO TRANSAC WESTERN MANAGER

RONALD J. R. KALLMAN has been named to the newly created position of Western Regional Manager for Transac computer systems by Philco's Government and Industrial Division. Mr. Kallman was formerly with the Burroughs Corporation ElectroData Division, Sylvania Electric Company and Massachusetts Institute of Technology Research Laboratory for Electronics. He received his B.S. degree from M.I.T. and Master's degree from Harvard Business School.

JOHN DIEBOLD MERGER CREATES NEW EXECUTIVE

ARNOLD D. PALLEY, Vice President of Griffenhagen & Associates, management consultants, has been named Managing Director of a new British firm specializing in automatic data processing and automatic consulting. This new firm, Urwick-Diebold, Ltd., represents a merger of the U.S. consulting firm, John Diebold & Associates, Inc. with the British consulting firm, Urwick, Orr & Partners, Ltd. Mr. Palley is a native of New York City; he received his B.A. degree from the University of Chicago.

20th ANNIVERSARY

KURT VASEN, Western Regional Manager of the Victor Adding Machine Company, is celebrating his 20th anniversary with the firm. He was transferred from Chicago to Los Angeles in 1943; his present offices are in Beverly Hills, California.

STANDARD REGISTER'S NEW AD DIRECTOR

JOHN F. ROBINSON has been named Director of Standard Register Company's new Advertising and Public Relations Division. He is a native of New York City and joined Standard in 1945. Previously Mr. Robinson was engaged in sales promotion activities with the Westinghouse Electric Corporation and Schenley Distillers.

YOUNKIN INCREASES RESPONSIBILITIES

GAVIN S. YOUNKIN, Vice President and General Sales Manager of Minneapolis-Honeywell Regulator Company is taking over active direction of the sales activities of the company's Datamatic Division which produces the Datamatic 1000.

TEXAS GETS NEW BURROUGHS MAN

DONALD L. BENSCOTER has been named Dallas District Manager for the Burroughs Corporation's ElectroData Division. He will be in charge of the sales and service of the Burroughs line of computers and data processing systems in the South Central states. Mr. Benscoter is a graduate of Michigan State University; he joined Burroughs in 1948.

AWARD TO WESTERN UNION ENGINEER

WILLIAM DAIL CANNON received the 1958 F. E. d'Humy Medal for scientific research resulting in important technical advances in the nation's communications. Mr. Cannon is a research engineer with the Western Union Telegraph Company. A native of Delaware, he received his M.S. degree at the University of Illinois in 1921 and has since been with Western Union.

UNIVAC USERS HEAR HARVARD'S LEONTIEF

WASSILY LEONTIEF, Director of Economic Research, Harvard University, gave a luncheon address at a Univac Users' Conference held in Boston. Representatives of various organizations now using Univac heard Mr. Leontief speak on "The Use of Large Scale Computers as an Aid in Management Decisions."

■ ■ ■

FERRANTI

HIGH SPEED TAPE READER

...handles punched tape data at electronic speeds

The Ferranti High Speed Tape Reader accelerates to full speed within 5 milliseconds and stops within 3 milliseconds. It has achieved a sound reputation for simplicity and reliability in regular operation.

Proven Reliability in hundreds of data processing and data transmission installations from coast to coast.

Photoelectric Sensing uses "pin hole camera" optical system for increased signal/noise ratio with any type of fully punched tape; no lenses or mirrors. Output signals greater than 20 volt.

Rugged Differential Type Friction Drive eliminates sprocket hole wear and requires very little maintenance.

Stop-on-a-Character feed mechanism allows operation in any mode from free run to stop on every character at *any* speed up to 200 characters/sec. Feed speed controlled by equipment receiving data. Tape positioned by sprocket hole associated with character being read, eliminating errors due to variations in character pitch. Higher speed models available for 400 characters per second, stopping on or before next character.

Simple Tape Loading with no threading. Character being read is visible to operator. Lap or butt splices accepted.

No Minimum Tape Length. Compatible motorized spooling units available for lengths up to 1,000 feet.

Desk or Console Mounting for comfortable operation.

Size 9" x 11½" x 11¼", Weight 37 lbs.

Consult Ferranti Electric for any paper tape reading problem.

FERRANTI

FERRANTI ELECTRIC, INC.

30 Rockefeller Plaza New York 20, N. Y.

Circle No. 10 on Reader Service Card.

OUTPUTS
ITEMS OF INTEREST FROM HERE AND THERE

PHILCO'S TRANSISTORIZED AIR-BORNE COMPUTER

An all-transistor airborne computer, the Philco Transac C-1100 series, is ready for production. Its outstanding feature, transistorized circuitry, combined with high speed operation, flexibility, and reliability, suit it for mobile applications in addition to aircraft control. It operates 10 times faster than any other now-available airborne computer.

FACIT OPENS BRANCH OFFICE IN EVANSTON, ILLINOIS

A new Midwest branch office has been opened in Evanston, Ill., by Facit, Inc., national distributor of Swedish-made Facit typewriters, calculators and Odhner adding machines. A striking feature of the offices is the modern Swedish decor — furniture was custom-made in Sweden by Facit's parent company, AB Atvidabergs Industrier.

Attending the opening of the branch, celebrated with a traditional Swedish smorgasbord and reception, were Gunnar Ericsson, president of Atvidabergs and Carl Skande, General Export Manager, from Sweden. Eric Holsson represented Facit, Atvidaberg's marketing company in the United States. Atvidabergs is one of the oldest corporations of the world, its origin dating back some 102 years before Columbus discovered America.

NEW AIR FORCE COMMUNICATIONS CENTER

The United States Air Force has inaugurated the fourth of five new domestic high-speed electronic communications centers at Carswell Air Force Base, Texas. The domestic network will eventually be extended around the globe.

Five fully automatic centers will act as hubs for the nationwide exchange of messages between all U.S. air bases. The 250,000-mile private wire network, the world's largest, links more than 200 Air Force terminal communications points throughout the country. The capacity of the new system will be more than two and one-half billion words annually.

The network is designed, installed and leased by Western Union. With the inauguration of the Carswell Center, Western Union's revenues from private wire leasing passed $41,000,000 annually.

SIMPLEX ACQUIRES IBM TIME EQUIPMENT DIVISION

The Simplex Time Recorder Company, Gardner, Mass., has acquired the domestic IBM Time Equipment Division. T. J. Watson, Jr., President of IBM, stated that the Time Equipment Division in recent years has accounted for less than 3% of IBM gross revenues and its products have become less compatible with the operations of IBM's other and larger divisions.

The Simplex Company is devoted entirely to the field of time recording and time indicating devices. Mr. C. G. Watkins, President of Simplex, said that the addition of IBM Time Systems to its other products will enable it to compete more vigorously with other producers who also intend to offer complete time and recording systems.

Paul S. Wells, General Manager of the IBM Time Equipment Division, joined the Simplex Company as Vice President in Charge of Sales. IBM will continue the manufacture and sale of time equipment products outside the United States, and will continue to service all time equipment products. The IBM Data Processing Division will continue to manufacture the Type 820 Time Punch.

TERRY, THE HUNTRESS

The University of Michigan has combined a powerful microscope, television camera and special electronic computer to form a machine that can recognize certain situations as well as humans can, and 15 times faster. It has been named "Terry" for the Greek "Thereteira" or "Huntress."

Terry's job is to detect and count thousands of faint tracks left by atomic particles flying through sheets of photographic film. It holds promise of relieving humans of this slow, tedious task, being able to scan in one and one-half hours as much film as a human can in four days.

COMPUTER LANGUAGE TRANSLATOR

North American Aviation Missile Division has placed an order for a Computer Language Translator with the Electronic Engineering Company of California. The CLT is to be used for rapid interchange of data between different types of data processing equipment. Magnetic tapes recorded in the format of one computer can be translated and recorded on another magnetic tape directly usable by a different computer. It can also convert punched cards or punched paper tape to magnetic tape and vice versa.

TINY NEW TYPE MAGNETIC COMPONENT SEEN SHRINKING PRICE AND SIZE OF COMPUTER EQUIPMENT

Development of a new type dime-size magnetic component which promises to cut the cost of many electronic computers by one-third was announced by the Potter Instrument Company.

Sealed in tough epoxy plastic, the new component — called a transient permanent magnistor — will also make possible high-speed printer systems two-thirds smaller than those now in use.

Magnistors are so durable that they can be incorporated directly into data processing computer equipment circuits without provision for replacement. Behind the substantial cost and space savings for data processing equipment is the magnistor's ability to do the work of a whole battery of electron tubes, transistors, resistors and printed circuits. Mr. Potter forecasts a "ready market" for the new magnistor with orders already in the books from a number of well-known computer manufacturers. The new type magnistor is to be produced in Puerto Rico, mainly because of the high manual dexterity and productivity of Puerto Ricans in delicate coil-winding and assembly done under magnifying lenses.

FRIDEN OPENS DUTCH PLANT

Vice-President and General Manager Philip R. Samwell attended the dedication of Friden's new Nimegen plant in The Netherlands when he was in Europe recently at the Paris Exposition for Office Appliances.

PENNSYLVANIA GETS STATE EDP CENTER

Pennsylvania is the first state to establish an electronic data processing center for all its departments and agencies.

Opened last fall at Harrisburg, the center uses a large-scale Remington Rand Univac electronic computer to process the state's information. Its first application is the Health Department payroll. The computer is expected to be used on a continual 24-hour, three-shift basis in about a year. In estimating, the payroll processing alone will save Pennsylvania $300,000 a year.

The State's Univac consists of 34 pieces of equipment and is leased at a monthly cost of $25,000. The public may watch it in operation via a glassed-in observation room.

A DIRECT ACCESS PHOTOMEMORY CELL

Millions of photographic "bits" may become the memory for computers of the future since an ultraviolet light technique of producing data storage has been developed by IBM.

Self-developing film is the computer storage medium. Cut in eight-inch strips, the film surface has a chemical composition such that it can form a visible photographic dot image immediately on exposure to a pin point of ultraviolet light. Each dot — or lack of dot — represents a digit. These images, 100,000 per strip, form a pattern of parallel lines along the length of the film. Reading is done with a visible light beam which can sense the "dot" or "no-dot" code. Visible also to the human eye, these images are permanent, non-volatile and non-erasable.

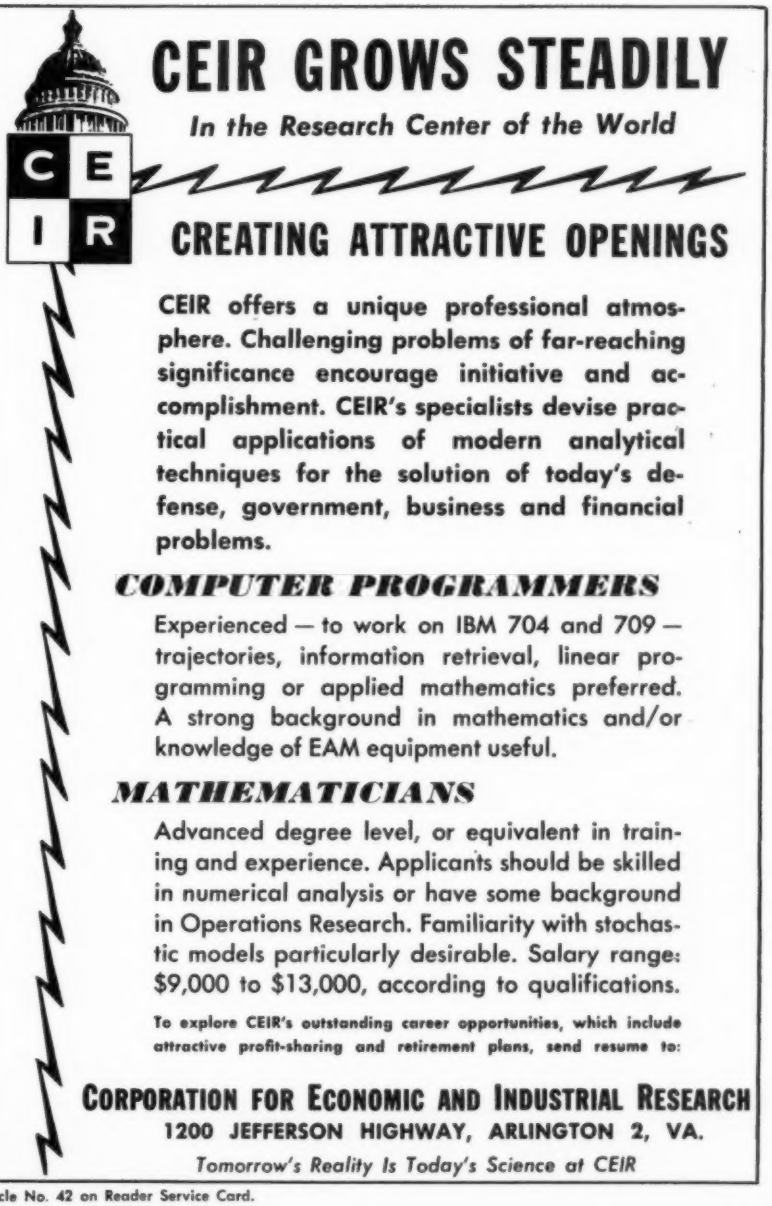
TESTING TRANSISTORS

The rapid, automatic testing of transistors, to a degree of accuracy hitherto unknown in the electronics industry, is accomplished by a new machine revealed recently by Stromberg-Carlson, a division of General Dynamics Corporation.

It will process any type of transistor through seven successive tests, at rates up to 430 transistors per hour. Similar tests generally now performed only on transistors for highly-critical military applications, are done manually, using a large array of costly instruments and fixtures. They require highly skilled personnel and are very laborious and time-consuming.

The new machine was designed especially for the Sperry Gyroscope Company, a division of Sperry-Rand Corporation, to enable that firm to test transistors rapidly and economically for exceptionally stringent military requirements. These requirements had been studied by Sperry for more than a year. Following this study the test criteria were established in consultation with Stromberg-Carlson engineers and leading manufacturers of transistors.

Operation of the machine is completely automatic, requiring only one operator for loading. An additional facility, called a "remote test table," provides for even greater output where less extensive tests are needed. With up to six operators working at this table as many as 2,000 transistors can be tested per hour.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Experienced — to work on IBM 704 and 709 — trajectories, information retrieval, linear programming or applied mathematics preferred. A strong background in mathematics and/or knowledge of EAM equipment useful.
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Advanced degree level, or equivalent in training and experience. Applicants should be skilled in numerical analysis or have some background in Operations Research. Familiarity with stochastic models particularly desirable. Salary range: $9,000 to $13,000, according to qualifications.
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GENERAL ELECTRIC'S COMPUTER CENTER

General Electric offers complete computing services at its Center, operated at Arizona State University in Phoenix. The equipment includes an IBM 704 computer with high-speed, random access magnetic core memory, magnetic drum memory and ten magnetic tape units. Output is available in printed records, punched cards and magnetic tape.

JET BOOKKEEPING IN A JET AGE

American Airlines will be using an IBM electronic system to transmit information on all their flights across the United States, including the new 4½-hour jet service. With this bookkeeping system clerks can tell instantly which seats are free.

The new jets have made more than two million flights—simulated flights, that is—with the help of electronic machines which calculate the jets' fuel loads, payloads, schedules, etc., as if they were on regular runs.

LIFE IN THE SPACE AGE

Dr. Melvin Calvin, Professor of Chemistry at the University of California, accepts the reasoning of modern astronomers that in our visible universe there are probably 100 million other planets with life on them. This "life" may range from micro-organisms to language-speaking, thinking beings.

The kind of life that exists on earth, Dr. Calvin points out, has reached a critical stage. The highest product of its evolutionary chain—man—is on the point of learning how to navigate space and spread beyond the earth. "There is no reason to suppose that life, and man as its representative, will not transform any planet on which he lands, in the same way, or even in a more profound way than he has transformed the surface of the earth. It might suit him to change the orbit of the moon, and it seems within the realm of possibility that he should be able to do so. When we realize that other organisms may be doing similar things at some millions of regions in the universe, we see that life itself and man, as one representative of that state of organization of matter, becomes a cosmic influence himself."

RULY ENGLISH

Giant computers' exactitude has some disadvantages, as the U. S. Patent Office learned in its effort to design a computer capable of extracting from its memory all earlier references of a patent-seeking idea. Ordinary English, with its varied shades of meaning in one word, i.e., CHEST for that portion of the body, or a piece of furniture; GLASS for material, opticals, water glasses, eyeglasses made out of plastic, confuses the precise machines.

To bridge the communication breakdown, the Patent Office is working on "Ruly English," a synthetic language especially suited to a computer's simple brain. In the new language, certain words, particularly prepositions, which have been found to have the most irrationally overlapped meanings, will be replaced by new Ruly terms which have single meanings.

More complicated words of Ruly English are meant to eliminate confusion caused by differing points of view. Both a watch spring and a heavy bridge girder are flexible in some degree. Both are also somewhat rigid. All objects, in fact, lie somewhere on the scale between extreme flexibility and extreme rigidity. So there has been arbitrarily coined the Ruly word *resilrig* to cover the whole scale, and such prefixes as *sli* (slightly) and *sub* (substantially) have been added. In Ruly English, a bridge girder would be *sliresilrig* and a watch spring *subresilrig*. A properly trained computer would know the meaning exactly. It would not be confused by the fact that in unruly English a very flexible bridge is not nearly as flexible as a very rigid watch spring.

USEFUL LITERATURE

For your convenience in obtaining pertinent and helpful information on the latest equipment, forms, services and related products in the data processing field, we direct your attention to the following free literature available from the manufacturers. Circle the numbers pertaining to the literature you wish to receive on the Reader Service Card appearing elsewhere in "MA & DP." Mail the card to us and we will speedily forward your requests.

"PROGRAMMING — A NEW PROFESSION FOR YOU," is a new 32-page booklet that outlines in readable, non-technical language the role of the programmer in industry today, the exact nature of the work involved in all phases of programming, the training of a would-be programmer, the qualifications necessary for the job and the future possibilities for newcomers in this field. Remington Rand, 315 Fourth Ave., New York 10, N. Y.

Circle No. 11 on Reader Service Card.

PRINT-PUNCH PRICE TICKETS and marking machines are described in this twenty-page brochure, together with their applications, new methods for attaching and re-marking methods. Dennison Manufacturing Co., Framingham, Mass.

Circle No. 12 on Reader Service Card.

AUTOMATION FOR BANKS is described in a 16-page brochure with reference to NCR equipment now available and equipment still to come. A timetable showing the various steps towards complete bank automation is included. National Cash Register Co., Dayton 9, Ohio.

Circle No. 13 on Reader Service Card.

LABELING MACHINES that automatically feed, label and stamp magazines, envelopes, booklets, postcards and other mailing pieces are described in an informative brochure. Chelshire, Inc., 1644 North Honore St., Chicago 22, Ill.

Circle No. 14 on Reader Service Card.

THE COMPUTER LANGUAGE TRANSLATOR, which provides for translation of data between different types of electronic computers and data processing equipment, is described in a 38-page brochure, which includes technical information as well

as system engineering services, sales or lease terms, and maintenance service. Electronic Engineering Company of California, 1601 East Chestnut Ave., Santa Ana, Calif.

Circle No. 15 on Reader Service Card.

"HARMONIC ANALYSIS with the Univac 120 Punched-Card Electronic Computer" is the title of a new 16-page brochure prepared for those engaged in scientific inquiry, working with information derived from experimental results of laboratory research. Remington Rand, 315 Fourth Ave., New York 10, N.Y.

Circle No. 16 on Reader Service Card.

PUNCHED CARD ADDRESSING by means of a name and address window stencil on a standard punched card, enabling conventional machine file sorting and collating, is described in a four-page brochure. The Elliott Addressing Machine Co., 143 Albany St., Cambridge 39, Mass.

Circle No. 17 on Reader Service Card.

CHARACTER-SENSING EQUIPMENT is described in a series of papers contained in one package, including information on Selfchek, the Eye, Scandex and document-sensing in general. Intelligent Machines Research Corp., 7019 Edsall Road, Alexandria, Va.

Circle No. 18 on Reader Service Card.

MODEL 28 AUTOMATIC SEND-RECEIVE SET, a high-capacity send-receive message station with tape punch and tape reader units, is described in a 12-page brochure. Teletype Corp., 7 Dey St., New York 7, N. Y.

Circle No. 19 on Reader Service Card.

POSTAL INFORMATION is supplied comprehensively in a 56-page book containing the latest information on postal laws and reference data on such subjects as envelope mailing weights, paper-and-ink weights, etc. Tension Envelope Corp., 19th and Campbell Sts., Kansas City 8, Mo.

Circle No. 20 on Reader Service Card.

MAGNETIC TAPE STORAGE equipment is described in a four-page brochure. Records Reserve Corp, 751 Clay Rd., Rochester 23, N.Y.

Circle No. 21 on Reader Service Card.

LGP-30 ELECTRONIC DIGITAL COMPUTER application to heat exchanger designs for the Brown Fintube Company in Ohio is described in an application report. Royal McBee Corp., Data Processing Division, Port Chester, N.Y.

Circle No. 22 on Reader Service Card.

"BASIC CONCEPTS OF INFORMATION RETRIEVAL" is a document designed to help fill the need for a standardized point of view from which to evaluate different systems or to design new systems. This is the first of several papers to be published on the subject of information retrieval by electronic computers. Remington Rand, 315 Fourth Ave., New York 10, N.Y.

Circle No. 23 on Reader Service Card.

FRIDEN CLASSROOM MANUAL, a 52-page book containing 20 progressive lessons, deals with addition, subtraction, semi-automatic multiplication and division, as well as the advantages of automatic multiplication. This book and a companion answer book are available for Friden users. Friden, Inc., 2350 Washington Ave., San Leandro, Calif.

Circle No. 24 on Reader Service Card.

"DIAL YOUR ANSWERS" is the name of a 24-page booklet describing various applications using General Electric's Model 306 Analog Computer. General Electric, Computer Dept., Phoenix, Ariz.

Circle No. 25 on Reader Service Card.

HISTORY OF BANK CHECK PROCESSING is given in a booklet which traces methods in use beginning with the first chartered U.S. Bank in 1782. Cummins-Chicago Corp., 4740 N. Ravenswood, Chicago, Ill.

Circle No. 26 on Reader Service Card.

BINDERS for marginal punched continuous forms of a variety of styles and uses are detailed, with complete specifications and prices. The C. E. Sheppard Co., 44-01 21st Street, Long Island City 1, N.Y.

Circle No. 27 on Reader Service Card.

VISIBLE LEDGER FILES for punched paper tape or edge punched cards are described in a four-page brochure. Logan Business Products, Vue-Fax Division, Westbury, N. Y.

Circle No. 28 on Reader Service Card.

NCR's MODEL 304 ELECTRONIC DATA PROCESSING SYSTEM is described in a ten-page brochure. In addition to the high-speed central processing unit, transistorized throughout and with core memory, the various component parts of the system, such as the high-speed punched card and paper tape readers and the high-speed printer, paper tape punch and card punch are described. The complete system has many interesting features. The National Cash Register Co., Dayton 9, Ohio.

Circle No. 29 on Reader Service Card.

CATALOG TEN—DATA PROCESSING AUXILIARY EQUIPMENT is a 100-page catalog including a complete line of card files, open reference (tub) files, card racks and trucks, Storaways and other control panel cabinets, card punch desks, wiring equipment and tape handling equipment. Tab Products Co., 995 Market St., San Francisco 3, Calif.

Circle No. 30 on Reader Service Card.

ELECTRONIC PARTS AND EQUIPMENT, 32,000 separate items in all, are contained in the 452-page general catalog for 1959. Allied Radio Corp., 833 W. Jackson Blvd., Chicago, Ill.

Circle No. 31 on Reader Service Card.

AUXILIARY TAPE PROCESSING EQUIPMENT, offering several special features, singly or in combination (Tape Tester, Tape Interrogate, Tape Editor, Tape Translator or Tape Copier) is described in a six-page brochure. Digitronics Corp., Albertson Ave., Albertson, L.I., N.Y.

Circle No. 32 on Reader Service Card.

ELECTRONIC MOTOR FREIGHT ACCOUNTING, an application of the Univac File-Computer system, is described in a brochure. Remington Rand, 315 Fourth Ave., New York 10, N.Y.

Circle No. 33 on Reader Service Card.

KEYSORT TABULATING PUNCH, which punches quantities in Keysort cards, accumulates and prints amount on tape, also reads amounts punched in cards, prints items and results on tape, duplicates cards and punches summary cards. Royal McBee Corp., Port Chester, N.Y.

Circle No. 34 on Reader Service Card.

QUIKSWITCH 80-80, a switchable 80-80 plugboard for the IBM 514 or

CALENDAR of Coming Events

1959

Feb. 10-13 High-Speed Computer Conference
Louisiana State University, Baton Rouge, La.

Feb. 17 Society for Advancement of Management
"Decision Making Seminar"
New York, N.Y.

March 2-6 Western Joint Computer Conference
(Sponsored by PGEC, AIEE and ACM)
Fairmont Hotel, San Francisco, Calif.
Contact: M. L. Lesser
IBM Research Laboratory
San Jose, Calif.

March 10 Society for Advancement of Management
"Work Sampling Clinic"
New York, N.Y.

March 12-14 National Association of Accountants
"First Subject Conference"
Hotel Statler, Cleveland, Ohio

April 2-4 Joint Meeting of Institute of Mathematical Statistics (Central Region) and Association for Computing Machinery
Case Institute of Technology
Contact: (IMS) Martin B. Wilk
Bell Telephone Labs
Murray Hill, New Jersey
(ACM) Dan Teichroew
National Cash Register
Dayton 9, Ohio

May 6-8 American Association of Collegiate Schools of Business
"41st Annual Meeting"
Hotel Fontainebleau, Miami Beach, Fla.
Contact: Maurice W. Lee, Dean of the School of Business Administration
University of North Carolina
Chapel Hill, N.C.

June 13-21 UNESCO
"First International Conference on Information Processing" (ICIP)
Paris, France
Contact: U.S. Committee for the First International Conference on Information Processing
Box 4999
Washington 8, D.C.

519 Reproducer, is described in a four-page brochure. This plugboard provides an external switch for each column, switch up for reproduce and compare, switch down for blank or gang punch. The Snapout Forms Co., Chardon, Ohio.

Circle No. 35 on Reader Service Card.

CARD PUNCH COUPLER is a device for coupling a NCR Accounting Machine to a keypunch so that by-product punched cards can be produced. It in no way interferes with the operations of the accounting machine. National Cash Register Co., Dayton 9, Ohio.

Circle No. 36 on Reader Service Card.

MARGINALLY-PUNCHED PIN FEED LABELS are described in a four-page folder which also contains examples of types of pressure-sensitive self-sticking labels for a variety of novel applications. Allen Hollander Co., Inc., 385 Gerard Ave., New York 51, N.Y.

Circle No. 37 on Reader Service Card.

AUXILIARY TYPEWRITER STAND which easily attaches to flat top metal desk so as to provide space for typewriter while leaving desk top free. The Globe-Wernicke Co., Cincinnati 12, Ohio.

Circle No. 38 on Reader Service Card.

PAPER TAPE RECORDERS to obtain a by-product recording of a transaction when attached to a cash register are described in a detailed 12-page brochure. The National Cash Register Co., Dayton 9, Ohio.

Circle No. 39 on Reader Service Card.

AUTOMATIC TAB-RIBBON REINKERS have reportedly reduced monthly usage from 95 ribbons to less than 9. This manufacturer also makes nylon tab-ribbons and ribbon and type protectors. Price list on request. O. W. Markes, 43043 Grand River, Box 282, Novi, Mich.

Circle No. 40 on Reader Service Card.

AUTOMATION for the electrical wholesale supply industry is described in a detailed case study of the Doubleday-Hill Electric Company. Applications include Order-Writing, Invoicing, Inventory Control, Accounts Receivable and related reports. The Snapout Forms Co., Chardon, Ohio.

Circle No. 41 on Reader Service Card.

■ ■ ■

"For Every Punched Card Installation There's a Vice President in Charge" *(continued from page 48)*

executives walks through the punched card department, it seems to him that some of the equipment is idle. This disturbs the official family, and they decide that more work should be assigned to the machine accounting department.

Before long, the company payroll, which was previously handled by one person, the purchasing operation, which formerly took three hours a week of the office manager's secretary's time, and a few other incidental applications now help to keep the machines busy. These applications, however, have tight schedules which must be met, which somewhat disturbs the normalcy or routine work for which the equipment was installed. At first, this causes delays and inaccuracies. Later, it brings on considerable overtime and soon more equipment and personnel must be added to take care of this additional work load. Temporarily, therefore, the officers' objectives were satisfied, their objectives being not to get the work out but to keep the machines busy. This kind of situation is obviously conjectural and couldn't happen in a modern office today.

The next case in point is related to the supervisor or manager of the punched card installation. Every time someone leaves the department, he must be replaced. The replacement has a lot to learn. Unfortunately, the organization has no provision for training and learning for the new addition to the staff is on a "catch-as-catch-can" basis. There is no time for training in this department since the supervisor can get the work completed in less time than it would take to tell someone how to do it. It is for this same reason that procedures in the form of flowcharts and job write-ups are not kept up-to-date. No records are kept here regarding machine utilization because the supervisor can make a pretty good guess if someone should ask, "How much does it cost the company to turn out its sales analysis report?" As a matter of fact, he figures that the sales analysis report doesn't cost a thing, because the equipment and people are there to do it anyhow. I think most of you will agree that this case is obviously hypothetical since all departments are managed a lot more scientifically than this one.

The last case in point has to do with the purchasing of supplies for the department. Forms and furniture are bought on the basis of price. Every time a form must be re-ordered or a new file must be added the order goes to the lowest bidder. There is no need to use a regular supplier who might on occasion have to be called upon for a rapid delivery because shortages are anticipated by the supervisor. Quality is not too important since, after all, paper is paper. The only variance from buying from the lowest bidder is influenced by a ticket to the World Series or a bottle of good booze during the holidays. It is true that one file may not be as convenient as another, or may not stand up as well under heavy service, but that can be somebody else's headache in a few years. This supervisor feels that accuracy control is a good idea and one effective accuracy control is the use of test decks. The extra five minutes per job that test deck might take, however, is a kind of a nuisance and a test deck is seldom if ever used. Certainly, this imaginary case couldn't exist because policy and practices in all organizations are established and adhered to.

The answer to the question, "At what management level are decisions made?" should perhaps be tempered by another question, "Does management make decisions?" Each of us probably knows of cases where the hypothetical situations above almost fit. Let's be sure that they don't fit us!

■ ■ ■

A Primer on Paper Tape *(continued from page 19)*

punched in a paper roll. But the manufacturer of player-piano rolls had no need for compatibility with other equipment. Today we find standard five-channel tape used to control milling machines, type-casting machines, etc.

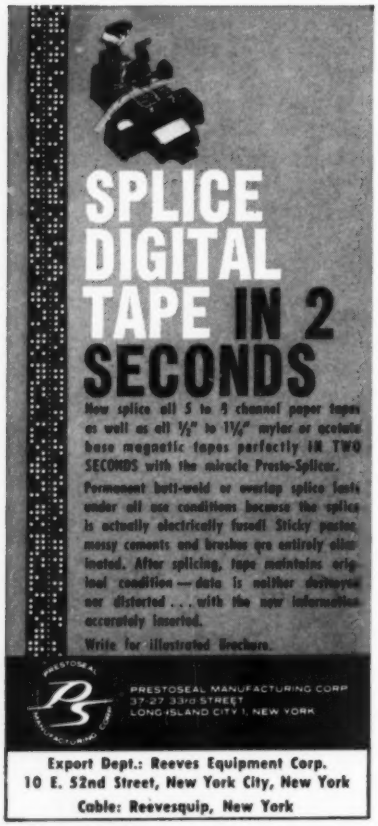
Drawbacks

While paper tape offers many advantages, some of its major drawbacks are that it is cumbersome to file, awkward to correct errors and difficult to reclassify information without first converting it to some form of unit record such as the punched card —though machines for making distributions directly from paper tape have recently become available.

A medium related to paper tape is the margin punched card. A card, which can be an ordinary punched card, is perforated along the top margin in the same manner as paper tape.

Unfortunately, in spite of the great need for compatibility between equipment manufactured by different companies, there does not seem to have been much progress toward standardizing the coding used in paper tape.

■ ■ ■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MA & DP BOOK SHELF

ADMINISTRATING A CONVERSION TO ELECTRONIC ACCOUNTING by Harold Farlow Craig, Harvard Business School, Division of Research, Soldiers Field, Boston 63, Mass., 1955, 224 pages, $2.50

This is a case study of an actual company—disguised here as the Amalgamated Insurance Company—that converted to an electronic accounting system. It is concerned mainly with administrative rather than technical problems and should be of the greatest interest and value to any company contemplating the introduction of electronic equipment, as well as those companies that have already achieved conversion.

This is a very ably prepared study, describing in detail the administration set-up and problems before and after conversion, with numerous verbatim interviews with key personnel. Professor Craig includes his own observations on the evidence presented and his recommendations arising from the study.

His major conclusion is that while there are no general rules which an administrator can follow blindly, reflection upon the evidence presented in this particular case study should provide an executive with an opportunity to develop a conceptual framework, an attitude of mind and an approach to his own administrative situation.

CONTROL FUNDAMENTALS, VOLUME 1 OF HANDBOOK OF AUTOMATION, COMPUTATION AND CONTROL edited by Eugene M. Grabbe, Simon Ramo and Dean E. Wooldridge, John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N.Y., 1958, 994 pages, $17.00

This is the first of three volumes; the other two, not as yet published, are to be called *Computers and Data Processing* and *Systems and Components*. This book is written for the technician, engineer or scientist; however, a great many subjects are treated and usually with pleasing brevity—there are 26 chapters written by 29 different contributors—and the exceptionally eager non-technician might find a selective browsing sufficiently rewarding. Subject matters in this first volume are General Mathematics, Numerical Analysis, Operations Research, Information Theory and Transmission and Feedback Control — an extremely wide range of content for even a book of this many pages.

AUTOMATIC DIGITAL CALCULATORS by A. D. Booth and K. H. V. Booth, Academic Press, Inc., 111 Fifth Ave., New York 3, N.Y., 1956, 261 pages, $6.00

This is a general introduction to electronic computers covering a wide range of subject matter (history, overall design, hardware, programming, applications) in a compact and easy to read style. Since it is slanted towards scientific computing and is generally technical in style, it will serve as an excellent introduction for the engineer or scientist. The British authors' approach to some problems pleasantly differs from that observed in similar American books on the market.

ELECTRONIC DIGITAL COMPUTERS by Franz L. Alt, Academic Press, Inc., 111 Fifth Ave., New York 3, N.Y., 1958, 336 pages, $10.00

Most of the early development of electronic computers was stimulated by engineering and scientific applications and many books on the subject are authored by scientists, even when they are written for the businessman. This one, subtitled *Their Use in Science and Engineering*, is for the computer designer or the programmer who has at least some mathematical background; however, there is much of general interest, especially in the areas of programming and coding, and the non-mathematician, if not inhibited by frequent use of scientific type examples, may benefit from many of the chapters.

HIGH SPEED DATA PROCESSING by C. C. Gotlieb and J. N. P. Hune, McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N.Y., 1958, 338 pages, $9.50

While there are several chapters on computers in general and hardware in particular, the main part of this book is devoted to the subject of solving problems on a computer, i.e., analysis, flow-charting, programming and coding. It is quite thorough, clearly written, and should be an excellent text for a college course (a set of problems is given in the appendix) or a comprehensive introduction for the trainee. A Basic Hypothetical Machine is introduced to allow for exemplification of ideas contained in the text. It is interesting to note that the authors have refrained from the universal practice of devising cute names for both real and mythical computers. Since the principles of programming, and even many of the details, are similar for various computers now on the market, there is little doubt that one can first study programming in general and then easily learn the details of a particular coding system.

BUSINESS ELECTRONICS REFERENCE GUIDE, VOLUME 4, edited by Peggy Courtney, Controllership Foundation, Inc., 2 Park Avenue, New York 16, N.Y., 1958, 602 pages, $15.00

The Controllership Foundation pioneered the publication of authoritative reference guides to electronic data processing in business. This is the fourth volume in the series and is an extremely useful reference guide. It contains comprehensive information on the various companies which now use computers, the number and types installed and the particular applications. A survey of all computers now being used is included, with detailed operating specifications and characteristics. There is also a list of training courses, publications, etc., and an extensive set of abstracts of articles from magazines. Unfortunately, it is stated in the foreword that this is to be the last such volume to be published.

TRANSISTOR MANUAL, now in its third edition, is a 168-page complete reference guide to transistors and their use. In addition to theory, specifications are given for the use of transistors in a variety of applications and circuits. Price is $1.00. General Electric Company, Semi-conductor Products Department, Syracuse, N.Y.

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COMING in the NEXT ISSUE

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A Closer Look at Computer Feasibility

EDITORIAL

For Every Punched Card Installation, There's A Vice President In Charge

By Eugene F. Murphy

A GROUP OF EDUCATORS were discussing the management level at which they should aim their courses. One faction insisted that the punched card supervisor or data processing manager needed training the most and was more conscious of his need because he spent forty hours a week, or more, working at it. They claimed that there was a bigger market for education at this level because there were more punched card supervisors than interested executives. The other faction insisted that the officer in charge had the major decisions to make and therefore exerted a greater influence in the data processing management field. Furthermore, they replied in rebuttal, for every tab supervisor, there's a V.P.

You may be sure that this kind of discussion takes place at policy-making level in every organization that is concerned with tapping the machine accounting and data processing market. These firms include office equipment manufacturers, suppliers, management consultants, educational institutions, associations, service bureaus, and of course, publishers. You may be equally assured that the conclusions reached, if they are reached at all, are based on mixed opinions which vary according to the particular background and experience of those who happen to be sitting in on the meeting. Let's review a couple of cases in point to see how nebulous some of these conclusions can be.

Picture, if you will, the president of a medium-sized company, who has been bombarded at conferences and on the financial pages, as well as by his fellow club members, with office automation and its benefits. As he removes his spikes after a tough round of golf, he makes a decision that his organization probably should be using an electronic computer. The following morning, he buzzes for the comptroller and inquires what the organization has been doing to investigate the feasibility of electronics. The comptroller, being a fast thinker, replies that a feasibility committee is looking into this matter. Upon returning to his office, the comptroller sends a memo to three or four key people in the organization thereby appointing the feasibility committee. What he doesn't know is that the president put a memo on his calendar to check progress in a few months. Time passes and although the committee has not had time to take from their regular duties to analyze the situation effectively, the pressure from the president to the comptroller dictates that a medium-sized computer be placed on order. This is a reasonably safe move, they feel, because delivery of the computer is not scheduled for about 15 months and the contract can be cancelled a few months before delivery.

This time lag gives everybody a breather and an opportunity to decide for what it is that the computer which they ordered will be used. This case, of course, is hypothetical. Situations like this never actually happen in real life.

Take another case in point where a group of analysts are assigned to make a feasibility study to determine which type of computer should be ordered. The analysis involves a long and arduous job of collecting minute details related to a) the company's operations, and b) the specifications and limitations of computers of different manufacture. After long, hard months of investigation, trips to computer installations and to manufacturers' plants, after many computer courses and amid hundreds of pages of worksheets, flowcharts, diagrams and program coding sheets, the presentation to the Board of Directors is made. The company is a financial institution and has on its board men with different interests. One of them notes that computer manufacturer "A" banks with them and computer manufacturer "B" banks with their competition. A different clique of directors is more concerned with the investment end of the business. They note that computer manufacturer "A" borrows money from them and computer manufacturer "B" goes elsewhere for his loans. Without being concerned with the relative advantage and disadvantages as pointed out by the feasibility committee, two-thirds of the board decides to vote for computer manufacturer "A"—and the Chairman of the Board moves on with the meeting to other pressing new business. This, as you can see, is obviously a hypothetical case, and one which does not actually occur in American business.

The third case in point has to do with top management's review of punched card operations and evaluation of inefficiency. Before installing the punched card system in this company, it was agreed that the punched card method of doing things was more economical than the manual method. The system is installed, it is operating smoothly and it is saving the company money. It is also providing vital management reports that were not previously available. But every time one of the key

(continued on page 45)

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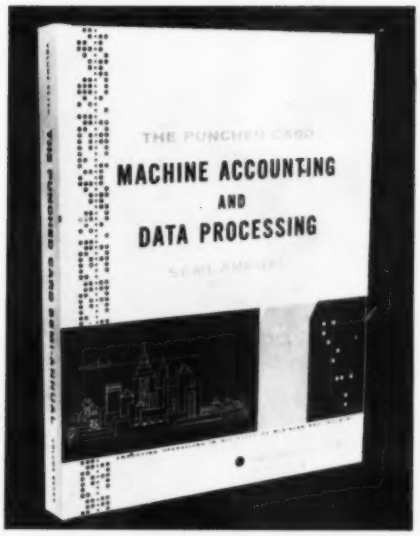

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